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Alberta

“I BELIEVE IN INNOVATION AND THE WAY YOU GET INNOVATION IS YOU FUND RESEARCH AND YOU LEARN THE BASIC FACTS.”

-Bill Gates

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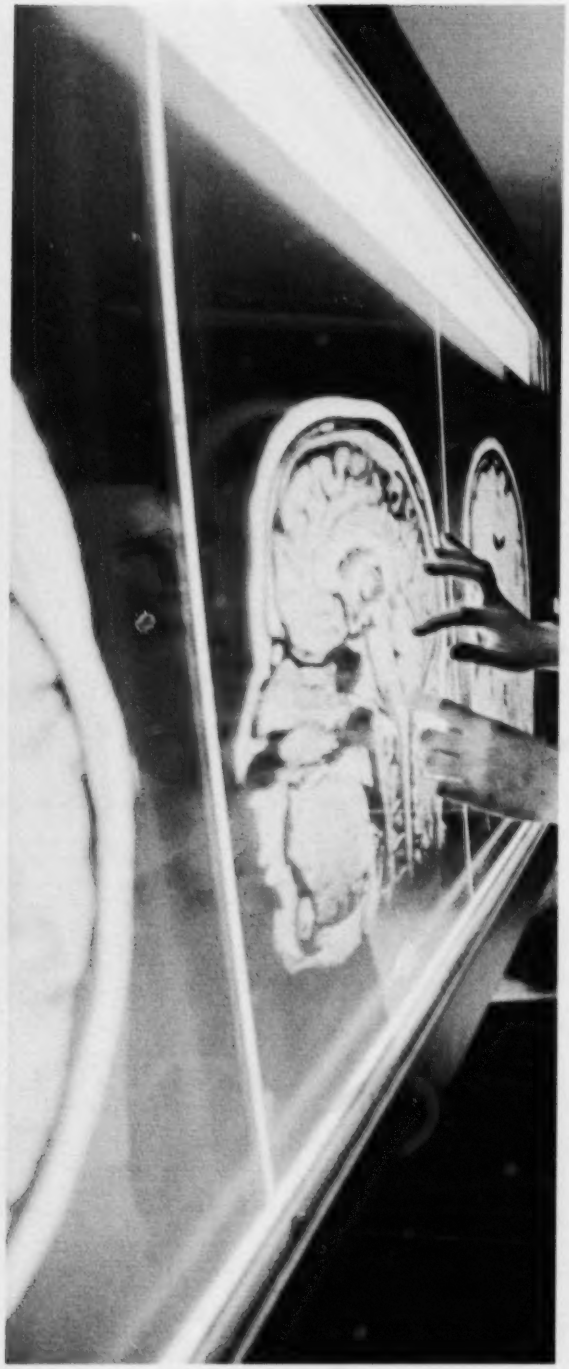


Making Impacts

Since 2000, The Research Capacity Program (RCP) and its predecessor programs have been active funders of research infrastructure at Alberta post-secondary institutions. In that time, the RCP has made considerable investments to strengthen Alberta's research system. The Alberta Government recognizes that unleashing innovation requires building research capacity and capability. The goal is to ensure that Alberta's researchers acquire cutting-edge tools and conduct innovative science in world-class centres of excellence.

ALIGNMENT

To build a strong and dynamic research and innovation system, the RCP aligns with Alberta strategic priorities. The RCP invests in innovative ideas that have the potential to:

- Diversify and grow the economy
- Add value to our resources
- Support and preserve our environment
- Improve the health and well-being of Albertans and their communities

COLLABORATION

The RCP also coordinates with the Alberta Innovates Corporations and Alberta post-secondary institutions to ensure that capacity is built within Alberta's strategic research areas and that small and large equipment investments complement other targeted provincial funding.

The RCP also serves as an important mechanism for leveraging funds from the federal Canada Foundation for Innovation (CFI) in order to maximize the research dollars flowing into Alberta.

THREE FUNDING STREAMS

- Small Equipment Grants
- Research Infrastructure
- College-Industry Innovation

IN THIS REPORT

This annual report highlights selected RCP investments that have supported world-class research infrastructure, building capacity, recruiting top quality researchers, and leveraging research funding.

Institute for Inflammatory Diseases

PROJECT
Institute for Inflammatory Diseases: A Common Focus for the Improvement of Health

INSTITUTION
University of Calgary

LEAD SCIENTIST
Dr. Paul Kubes

RCP FUNDING
$2,174,943

TOTAL PROJECT COST
$25,604,759

Research Capacity Program funds help with initial infrastructure costs and instrument purchases for scientists to pursue their research, attract more funding, develop other professionals working on or with their teams, attract top-level talent to the province, and create partnerships with industry throughout the province and across the world. At the heart of the matter, it is always about making a difference in the lives of Albertans.

At the University of Calgary's Snyder Institute, founding Director Dr. Paul Kubes – the Canadian Institutes of Health Research's Researcher of the Year in 2011 – has a primary research focus to understand the roles of immune cells during inflammation, infection and tissue injury. His team is leading the way in directly imaging the immune system using cutting edge technology, including spinning-disk confocal and multi-photon microscopy. By imaging cellular behaviors in real time, Dr. Kubes and his research team are beginning to understand how immune cells function in response to disease.

GENEROUS DONORS

With infrastructure commissioned in 2013, researchers at the RCP-funded Snyder Institute have helped develop new drugs for the treatment of malaria, diabetes, sepsis, and cancer. Teams in the Snyder Institute depend on collaborations with end users, including patients, patients' families, and philanthropists. One major supporter, Ms. J. Snyder, contributed over $10M to the Institute that now bears her family name. Gifts from Encana ($1M), the Lung Association of Alberta and North West Territories ($1.8M), the Tamaratt Foundation ($2M), and other generous donors have helped build the Snyder Institute and its integrated core facilities.

DID YOU KNOW?

3,000,000+
Canadians struggle with lung diseases

200,000+
Canadians face inflammatory bowel diseases

$6.45 billion
in direct health costs

$7.70 billion
in indirect health costs

The Snyder institute has helped Dr. Kubes and his team focus on improving patient lives and reducing health costs for all.

ATTRACTING TOP TALENT

The vibrant research environment and cutting-edge research tools have been key factors in recruiting and retaining intellectual talent. Recently, the Snyder Institute's new infrastructure, live cell imaging, and collaborative teams helped attract 16 top researchers from the United States, United Kingdom, Italy, and Canada. The infrastructure has been critical in the training of clinician scientists, who deliver both innovative research and direct changes to clinical practice.

50+ Trainees a year take their research experience with them to study medicine

6 Trainees have enrolled in the MD/PhD program in Calgary

Since 2008, the LCI has directly trained over 300 grad students, technicians, post-doctoral fellows, undergrads, investigators, and clinicians. Thanks to RCP-funded infrastructure, Alberta is now connected to academic and industrial research communities around the world through professors, lecturers, staff scientists, and fellows.

NEW PARTNERSHIPS

The availability of the suite of co-located equipment has quickly led to new and innovative inter-faculty collaborative projects, including two $5M Team Grants from Alberta Innovates Health Solutions, the Alberta IBD Consortium, and the Alberta Sepsis Network (ASN). Access to equipment and Alberta partnerships have enabled growth in national and international partnerships, including the UBC Centre for Disease Control, the Centre for Drug and Research Development, the National Microbiology Laboratory, and the World Health Organization.

RCP-funded infrastructure has enabled a number of partnerships with industry. ASN partnered with Pfizer to examine the effectiveness of vaccines. Another example is the LCI, which partnered with optics companies such as Quorum, Olympus, Nikon, Applied Precision and Zeiss to demonstrate the latest innovations in microscopy. These collaborations are just the tip of the iceberg for Dr. Kubes and his team.

DEFINING SUCCESS

Ultimate success for Dr. Kubes and his research team involves developing novel therapies to help patients and potentially generating value for Albertans through a new company.

nanoFAB: Fabrication and Characterization Facility

INSTITUTION
University of Alberta

LEAD SCIENTIST
Dr. Michael Brett

DIRECTOR
Dr. Eric Flaim

RCP FUNDING
$2,062,672

TOTAL PROJECT COST
$5,591,008

Without crucial infrastructure implemented in 2011, the University of Alberta wouldn't be the nanotechnology leader it is today. Funding for the University of Alberta Nanofabrication and Characterization Facility (nanoFAB) was a critical factor in locating the $220M National Research Council National Institute for Nanotechnology (NRC-NINT) to the University of Alberta. First established in 2001 in the cleanroom laboratory of the university's Electrical and Computer Engineering Research Facility, the nanoFAB is a major step forward in advancing the field of nanotechnology.

SMALL MATERIALS, BIG SOLUTIONS

Nanotechnology is the science of working with materials at the scale of approximately 3-4 atoms wide. If you can't visualize that, take a look at one human hair, and now consider building materials and consider building materials and machines that are only 1/10,000 of the width of that hair. That's nanotechnology.

THE FUTURE OF NANOTECHNOLOGY

Viewed as the foundation of the next major revolution in technology, its societal and economic impacts are expected to be more significant than those of the computer revolution. Albertans can benefit from the accelerated momentum provided through the research, development, and commercialization that has been enabled from nanotechnology.

THE LAB

The nanoFAB is a unique and highly specialized facility that focuses on design, fabrication and characterization at the micro- and nano-scale, allowing for advances in diverse fields such as; sensors and MEMS for natural resources and biomedical applications, photonics for ICT, interfacial science and engineering for energy applications, all within a robust training environment. Featuring an unparalleled combination of $110M in equipment and infrastructure, the nanoFAB supports local, regional, and national nanotechnology-related research and development activities. Its facilities are used by academic and industrial researchers from a wide range of disciplines, including medicine, agriculture, science and engineering. As an open-access facility, the nanoFAB charges minimal fees to access the available capabilities providing training, research and development support, and collaboration opportunities to academic and industrial groups. So far, the nanoFAB has helped recruit 115 professors in nanotechnology and attract over $60M in research funding.

SINCE 2006, THE NANOFAB HAS HAD:

1500+ Individual users

300+ Users from academic and industry groups

40+ Canadian companies

PARTNERSHIPS

The facility fosters significant industrial partnerships, which are essential not only for access to resources, but also as pathways to commercialization. Beyond the significant support provided to 40 Canadian companies, nanoFAB is directly involved in projects with international partners, including: GE Analytical Instruments (GE), Smith & Nephew, and Zeiss. nanoFab is a cornerstone partner with the National Institute for Nanotechnology in helping to deliver sustainable nanotechnology solutions with socioeconomic benefits to Canada.

An RCP and industry-funded electron beam lithography (EBL) system contributed to the fabrication of the world's smallest double clamped nanomechanical resonator, enabling scientists to develop new ultra-sensitive sensors. Applied Nanotools, an Alberta based company, is currently using the EBL system to commercialize various X-ray optic devices that could lead to more cost-efficient, robust medical diagnostics, as well as more advanced microscopy tools.

FUNDING OF THE NANOFAB HAS HELPED...

Increase growth of nano-engineering and science activity

Increase graduate students, post-doctoral and research associate recruitment and retention within the University of Alberta

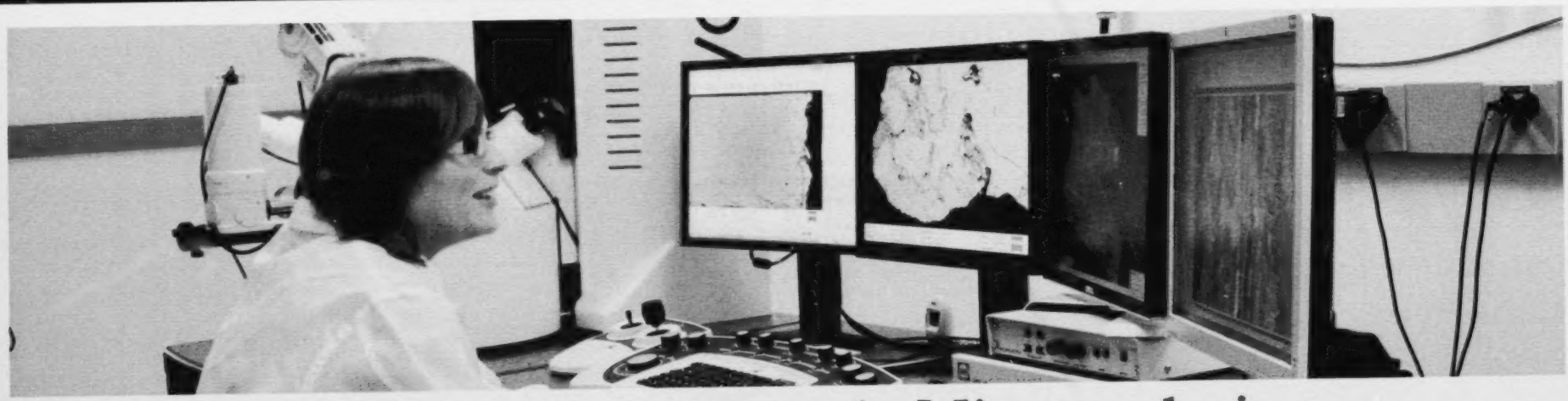
Enhance academic and industrial collaboration

The future is bright for nanoFAB as researchers focus on extending and enhancing the facility's capacity and expertise.

CASE - MICRALYNE

Number of employees: 160

An optical stepper proved to be an important piece of research equipment, as this tool now acts as the foundation for advanced production capabilities within nanoFAB partner company, Micralyne. As a key partner in the micro- and nano-technology industry in Alberta, Micralyne regularly hires new engineers and is a driver for economic diversification in Alberta. The new research infrastructure helps underpin Micralyne's long term success and sustainability and is a model for academic-industry partnership.



The Canadian Centre for Isotopic Microanalysis

The Canadian Centre for Isotopic Microanalysis (CCIM) is a leading edge facility at the University of Alberta dedicated to research on mineral and energy resources. With infrastructure implemented in 2012, the Centre provides the most advanced research tools for micrometer scale isotopic analyses currently available in Canada. Today, CCIM investments attract and recruit top post-doctoral researchers from around the globe. Researchers have access to leading-edge instrumentation and research expertise, and can collaborate with governments, academia, and industry partners to achieve new applications in natural resource research.

INSTITUTION
University of Alberta

LEAD SCIENTIST
Dr. Thomas Stachel

RCP FUNDING
$4,447,595

TOTAL PROJECT COST
$13,875,434

DID YOU KNOW?

Dr. Stachel's group collaborates with biological sciences researchers to explore the impacts of human activities on wildlife, including polar bears, grizzly bears, and fish.

Dr. Stachel's research team has ongoing collaborations with geological surveys, including the NWT Geoscience Centre and the Geological Survey of Canada.

About 15 graduate students and postdoctoral fellows receive hands-on experience in the CCIM each year.

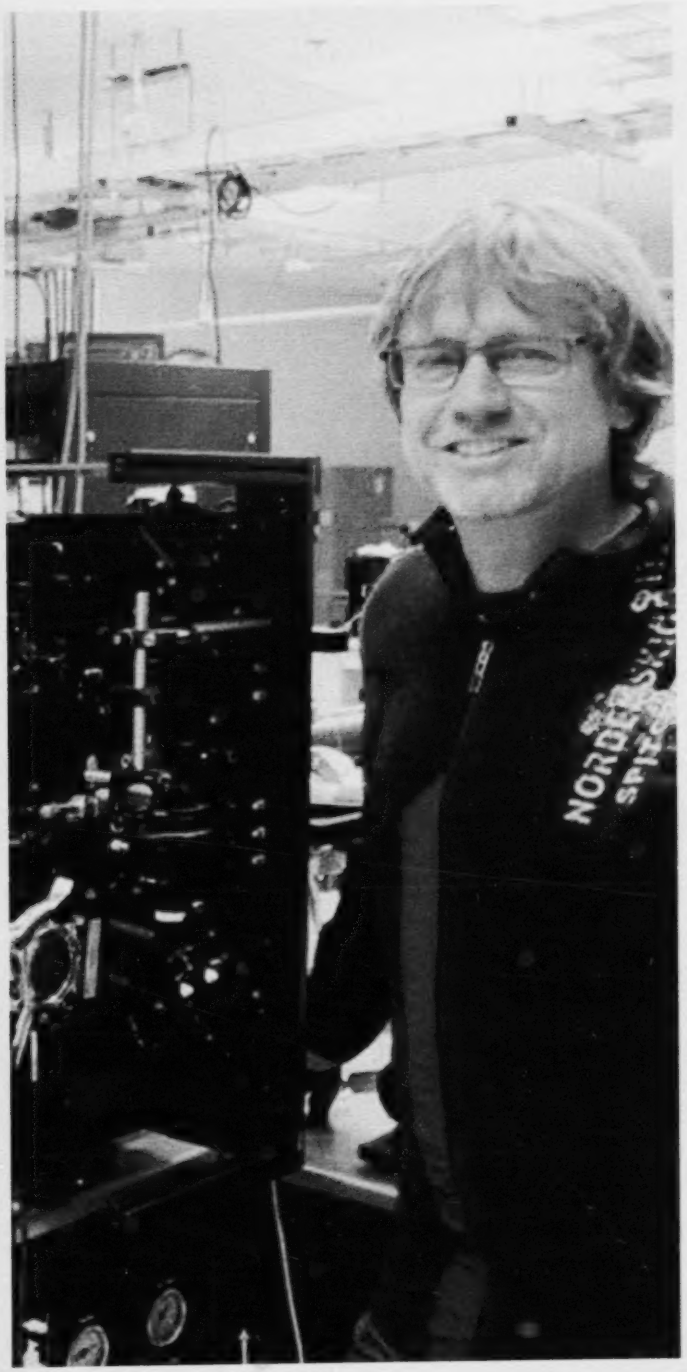
PARTNERSHIPS

CCIM continues to foster collaborations among research groups in the Department of Earth and Atmospheric Sciences. The petroleum group and the geochemistry group have started a number of collaborative projects enabled through the analytical facilities in CCIM. CCIM has enabled the formation of strong national and international partnerships with key institutions around the globe.

In the first five years of operation, CCIM's industry collaborations were focused on mineral exploration, working with industry leaders such as De Beers and Rio Tinto, and the key gem laboratories in the USA and China. Recent analytical developments for carbonate stable isotope analyses have allowed CCIM to apply knowledge and create partnerships with Alberta's oil and gas sector.

"Within only a few years, the unique research capacity built with RCP funding has made CCIM the prime destination for diamond researchers from around the globe. Achieving similar impact through research on other resources, in particular oil and gas reservoirs, is our next goal."

– Dr. Thomas Stachel



Ultrafast Nanotools Lab

"How does light interact with matter?"

This fundamental physics question is explored in Dr. Frank Hegmann's Ultrafast Nanotools Lab at the University of Alberta's Centennial Centre for Interdisciplinary Sciences. With infrastructure commissioned in 2011, the facility allows researchers to directly image ultrafast processes in materials and nanodevices over nanometer length scales.

INSTITUTION
University of Alberta

LEAD SCIENTIST
Dr. Frank Hegmann

RCP FUNDING
$975,000

TOTAL PROJECT FUNDING
$3,480,157

BREAKTHROUGH

The Ultrafast Nanotools Lab was the first in the world to couple terahertz (THz) pulses to the tip of a scanning tunneling microscope (STM) in a new instrument for probing ultrafast dynamics on the nanoscale. Recognized as one of the top THz wave photonics breakthroughs of 2013, researchers could zoom in on a single nanodot on the surface of a semiconductor and image how electrons fall into the nanodot over picosecond (one trillionth of a second!) time scales.

PROMISING OUTCOMES

Collaborations with biologists at the University of Lethbridge offered promising results on therapeutic approaches to skin cancer and psoriasis. For the first time ever, artificial human skin tissues were exposed to intense THz pulses with favourable outcomes. With assistance from TEC Edmonton, plans are currently underway to develop instrument prototypes and patentable THz technologies for diagnostic and therapeutic applications.

TRAINING

The Ultrafast Nanotools Lab has a positive impact on training highly qualified personnel. Students working in the UNL receive extensive training and the opportunity to work in areas such as optics, lasers, and nanostructures. Students can collaborate in an interdisciplinary environment with physicists, chemists, biologists, and engineers on a provincial, national, and international scale.

INDUSTRY CONNECTIONS

The Ultrafast Nanotools Lab has enabled positive relationships with industry in Alberta. Dr. Hegmann hopes to build on these interactions for the future.

The Ultra-Trace Clean-Laboratory

With infrastructure implemented in 2013, the ultra-trace clean-laboratory (UTCL) is an analytical and environmental toxicology laboratory that provides a very clean environment to enable the detection of human and environmental samples for emerging organic contaminants. By better understanding such contaminants, Dr. Jonathan Martin hopes to control exposure risk and recommend treatment options.

PROJECT

Ultra-Trace Clean- Laboratory for Environmental and Human Health Sciences Research on Emerging Organic Contaminants

INSTITUTION

University of Alberta

LEAD SCIENTIST

Dr. Jonathan Martin

RCP FUNDING

$183,586

TOTAL PROJECT COST

$1,284,325

PRACTICAL SOLUTIONS

The lab has been used to analyze oil sands process-affected water (OSPW) groundwater and surface water in the Athabasca Region for environmental forensic and toxicological purposes. New chemical contaminants in OSPW have been discovered and the chemicals most toxic to aquatic life are now being identified. Dr. Martin's lab helps industry make informed and sustainable decisions to mitigate environmental impacts.

TRAINING

Over the years, the UTCL has been leveraged to secure international, federal, and provincial research funding on a range of emerging contaminant issues. Through this funding, the UTCL has been able to recruit and train many graduate students and postdoctoral fellows.

COLLABORATIVE & INTERDISCIPLINARY

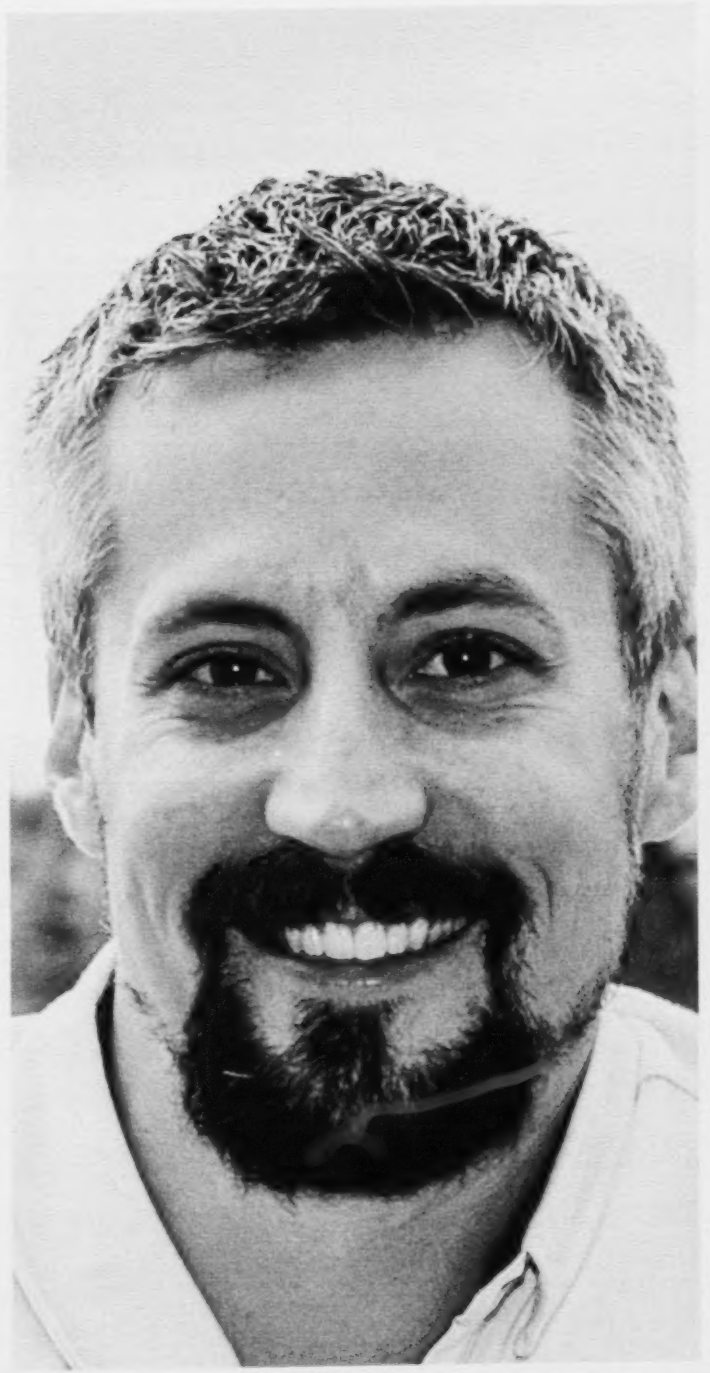
Dr. Martin's research in environmental analytical chemistry is done in collaboration with specialists such as toxicologists, engineers, nutritionists, behavioural and developmental experts, biologists, and geochemists.

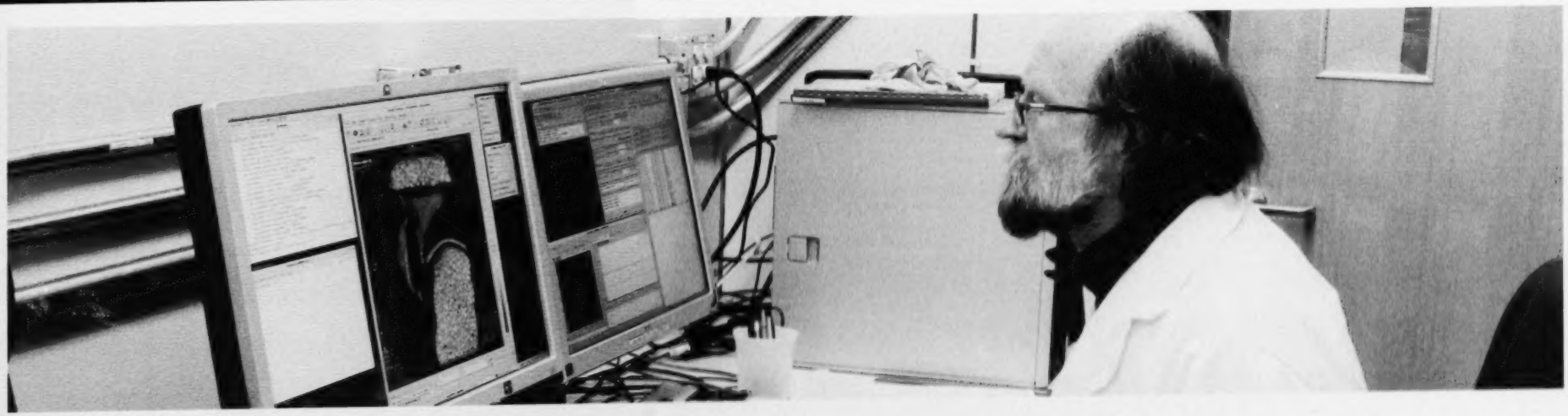
Some of Dr. Martin's projects even span institutions: his neurodevelopmental study, funded by the American National Institutes of Health and the Canadian Institutes of Health Research (CIHR), spans the University of Alberta, University of Calgary, and the Alberta Centre for Toxicology. The infrastructure has been essential for attracting funding from different sources, including the Natural Sciences & Engineering Research Council (NSERC), Alberta Water Research Institute (AWRI), and Alberta Innovates. So far, the facility has played a significant role in over 110 high-impact publications.

THE MARTIN GROUP...

Is cited **1000+** times per year

Has received numerous awards for outstanding research





Experimental Imaging Centre

The Experimental Imaging Centre (EIC) is recognized as being one of best in Canada for the imaging of mice and rats used as models in the study of diseases. This research is the key to developing new imaging methods for improving human and veterinary animal health. With infrastructure commissioned in 2013, the EIC serves as a critical resource in the development of multidisciplinary research programs using high-field MRI. The combination of the range of studies that are possible and the quality of the technology available makes the EIC a unique centre in Canada. For more information on the EIC, contact Dr. Dunn at dunnj@ucalgary.ca

INSTITUTION
University of Calgary

LEAD SCIENTIST
Dr. Jeff Dunn

RCP FUNDING
$1,800,000

TOTAL PROJECT COST
$10,751,832

INFRASTRUCTURE

The core infrastructure was Canada's first 9.4T MRI, built for animal imaging, and installed in collaboration with the National Research Council. Additional infrastructure include Canada's first helium cooled MRI coil for small animals, which improves the ability to undertake MR microscopy of the mouse brain.

MOVING FORWARD

As the project evolved, the EIC was used to leverage additional infrastructure targeted at translating imaging of mice and rat models to patient care. This includes an MRI designed for imaging larger animals and for studying joints in humans during function and disease progression. It also contains one of Canada's first near-infrared brain mapping systems, now being used to study brain function in multiple sclerosis and concussion. Dr. Dunn and his colleagues are now reaching out provincially and nationally to develop a Canadian network of MRI programs dedicated to improving the use of animal models in the discovery of disease processes and treatment options.

TRAINING

By 2013, **80 trainees** used the EIC to collect data and receive training in their field and in medical imaging.

Trainee breakdown:

32	Undergraduate level
36	Graduate level
12	Postdoctoral level

Medical imaging is a strong growth area that impacts many aspects of diagnosis and disease monitoring. The facility is an asset in attracting talent and training opportunities are often pointed out in recruitment visits as a facility highlight.

THE FUTURE

The EIC infrastructure has also attracted ongoing industry collaboration with BOSE. There has also been support from imaging companies in Germany and the United States.

Quantum Crytography and Communication Laboratory (QC2Lab)

RCP-funded infrastructure was used to equip a newly established laboratory for research into quantum communication and cryptography. With infrastructure commissioned in 2013, the QC2Lab includes the lease of a dark fibre that connects Dr. Wolfgang Tittel's laboratory at the University of Calgary with a laboratory at the Southern Alberta Institute of Technology Polytechnic. This fibre is used to test new quantum communication devices and protocols in a real-world environment.

INSTITUTION
University of Calgary

LEAD SCIENTIST
Dr. Wolfgang Tittel

RCP FUNDING
$627,644

TOTAL PROJECT COST
$2,356,974

DID YOU KNOW?

Dr. Tittel has published **32** experimental investigations on various aspects of quantum communications and **17** theoretical investigations or reviews.

Dr. Tittel was sponsored as a NSERC/GDC/iCORE Research Chair from 2007 to 2012, which, in turn, widened the training opportunities and improved recruitment due to the position's high visibility. Over the past 7 years, Dr. Tittel has collaborated with researchers from 10 different countries on interdisciplinary topics spanning across physics, chemistry, mathematics, and computer science.

DR. TITTEL'S TEAM

1
Sr. electrical engineer

3
Postdoctoral fellows

~10
Graduate students

These scientists were drawn to the facility's state-of-the-art RCP-sponsored infrastructure. Since Dr. Tittel joined the University of Calgary, 2 more faculty members were recruited to the Institute for Quantum Information Science (IQIS). By establishing a quantum cryptography and communication laboratory, the University of Calgary has positioned Alberta to become a world leader in information security.

THE BIG PICTURE

Dr. Tittel's research contributes to our province's cutting-edge research community. The QC2Lab plays a role in building a skilled workforce to grow and diversify Alberta's knowledge-based economy. This enhances the province's overall competitiveness in the global marketplace.

> ***"I am very grateful to Alberta's RCP, which has given me the opportunity to build a state-of-the-art laboratory and thereby triggered the establishment of a highly capable research team and cutting-edge research in the competitive field of quantum communications. Without the RCP, I would not be in Alberta."*** **–Dr. Wolfgang Tittel**

Infrastructure for Prion Research

University of Alberta researcher, Dr. Valerie Sim, is one of Canada's leading authorities in prion research. Dr. Sim is exploring the mechanisms of prion disease pathogenesis and how it relates to the structural characteristics of the underlying prion protein. By studying the early pathology changes that occur, researchers see how different infectious prion proteins influence disease progression, and gain insight into interventions which may stop the disease process.

PROJECT

Infrastructure for Studying Both the Biophysics of Infectious Prion Oligomers and the Prion Disease Pathology They Induce

INSTITUTION	LEAD SCIENTIST
University of Alberta	Dr. Valerie Sim
RCP FUNDING	TOTAL PROJECT COST
$400,000	$1,033,986

DID YOU KNOW?

Prion disease can affect both animals and humans, causing brain damage when prion proteins fold abnormally in the brain. The disease can sometimes be transmitted to humans via contaminated meat products and results can be fatal. You may recall the Bovine Spongiform Encephalopathy (BSE) or "mad cow" crisis that devastated Canada's cattle industry in 2003. Prion disease is also responsible for scrapie in sheep and chronic wasting disease in deer and elk.

COLLABORATIONS

With infrastructure commissioned in 2013, Dr. Sim's lab is located in the Centre for Prions and Protein Folding Diseases (CPPFD). Specialized biosafety containment precautions required for all prion work were supported by earlier RCP investments. Dr. Sim has been awarded research funding from PrioNet Canada and the Alberta Prion Research Institute (APRI). Collaborations have been established with researchers at the Universities of Alberta, Calgary, Lethbridge, Saskatchewan, Toronto, the Public Health Agency of Canada, the National Institutes of Health (USA), and the DZNE network in Germany. Researchers from other disciplines such as structural biology, physics, and chemistry benefit from the infrastructure.

TRAINING

Acquiring the new infrastructure has been extremely important to the training of highly qualified personnel in the broader area of prions and protein folding diseases. 6 post-doctoral fellows, graduate students, and new faculty have been recruited and/or retained due to the new infrastructure.

THE FUTURE

Dr. Sim is planning on working with TEC Edmonton to identify pathways towards future commercialization of potential new treatments for prion disease.

Infrastructure for Heart Disease Research

RCP-funded infrastructure has enabled Dr. Wayne Chen and his team to perform cutting-edge research on the mechanisms and treatment of cardiac arrhythmia and other heart diseases. The new equipment consists of a laser scanning confocal microscope, the most advanced imaging system built with an unprecedented resolution, speed, and sensitivity. This latest technology enables Dr. Chen to study signaling events produced by cardiac cells in unmatched detail.

PROJECT

Infrastructure for Understanding the Molecular Basis and Treatment of Cardiac Arrhythmias

INSTITUTION

University of Calgary

LEAD SCIENTIST

Dr. Wayne Chen

RCP FUNDING

$395,519

TOTAL PROJECT COST

$1,291,643

PRACTICAL APPLICATIONS

The knowledge obtained through the use of the infrastructure has enhanced our understanding of disease mechanisms that are essential for the diagnosis and treatment of heart diseases. This will lead to improvements in patient health and quality of life. Dr. Chen's work also has economic potential as a result of patenting and licensing of research results.

FUNDING

The new equipment has tremendously boosted Dr. Chen's competitiveness in obtaining research funding from federal, provincial, and private corporations. Previously, Dr. Chen and his team received a grant from the Canadian Institutes of Health Research (CIHR) and the Alberta Innovates Health Solutions Collaborative Research and Innovation Opportunities (CRIO) Award.

TRAINING

The infrastructure has enabled Dr. Chen to recruit and retain graduate students, postdoctoral fellows, and research associates. It has enhanced their environment for training and conducting research in more interdisciplinary areas.

Due to infrastructure being implemented in 2013, **6** researchers have been recruited and **13** graduate students have received training.

IMPACTS

The new equipment has allowed researchers to move the findings on disease mechanisms from the lab bench to the pharmaceutical market by developing novel and effective anti-arrhythmic drugs. It has enabled Dr. Chen to:

- Establish a world-class centre of excellence for cardiac arrhythmia research
- Continue bringing international and national research funding to Alberta
- Continue attracting and retaining high quality people to Alberta

Cumulative Results

RESEARCH CAPACITY PLANNING STRUCTURE

The RCP uses a cost-shared funding approach to provide up to 40 per cent of the total eligible project costs for successful proposals, enabling projects to leverage support from the Canada Foundation for Innovation (CFI). RCP funds provide up to 40 per cent of the project costs, enabling projects to leverage support from the CFI and other sources.

RCP's Cost-Shared Funding

Since 2000, the RCP has invested more than $261 million and has leveraged $789 million more in other funding, bringing a total of $1.05 billion to support research and innovation activities in Alberta. Despite the RCP's 40 per cent funding formula, the program has leveraged 75 per cent of all projects total costs from other sources.

RCP's Funds Leveraged

SINCE ITS INTRODUCTION, THE RCP HAS...

Invested in **444** research projects

Helped enable over **300** new and experienced professors to carry out their research activities in Alberta

Projects may include equipment, construction, renovations, specimens, and databases. Proposals must address strategic, fundamental infrastructure needs related to maintaining or enhancing the competitiveness of the Alberta university research system, and contribute to Alberta's economic competitiveness and/or quality of life.

TALENT

By attracting and retaining highly qualified people with equipment and facilities, the RCP is creating a climate that builds synergy and collaborations among Alberta's leading researchers, and is providing state-of-the-art training opportunities for graduate students - the next generation of talented innovators.

BENEFITS

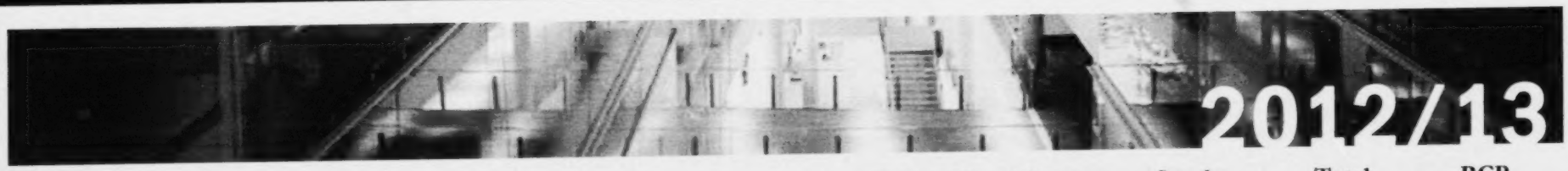
Some Alberta investments have helped to leverage significant national facilities, such as the Canada Light Source and Compute Canada, thus increasing the overall leverage of the program.

Key research activities enabled by RCP equipment support have gained national and international recognition and contributed to treatments and diagnoses for improved health outcomes, new environmentally sustainable practices, and more efficient oil, gas, and oil sands extraction, to name a few.

Alberta Research Capacity Program Projects

Research Infrastructure Stream

Infrastructure Sustainability Stream



Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
University of Alberta Centre for Functional, Structural, and Metabolic In Vivo Imaging of Disease	Funds are requested to purchase equipment for the characterization of heterogeneous catalysts under industrial conditions. The equipment consists of a chemisorption analyzer, which is capable of performing temperature programmed reactions, and a mass spectrometer to analyze products.	Christian Beaulieu	University of Alberta	$17,527,812	$5,500,000
Energy Materials Characterization and Control (EMC2)	The equipment will allow the characterization and control of materials at the nanoscale to deliver new technologies for energy generation, conversion, storage, and conservation based on the development of new materials, systems, and devices for solar and fuel cells, catalysts, batteries, and new electronics. EMC2 will elevate the established research environment to the highest international level, and will enable transformative research and technology development.	Kenneth Cadien	University of Alberta	$13,124,623	$3,986,163
Centre for Neural Interfaces and Rehabilitation Neuroscience (CNIRN)	CNIRN will facilitate the translation of basic nervous system research to the development of solutions for neurological problems and limb amputations. CNIRN will enable the development of critical interventions that will restore physical functions and prevent secondary complications. This will improve the lives of Canadians, contribute to the sustainability of the health care system, and place Alberta at the forefront of rehabilitation research.	Vivian Mushahwar	University of Alberta	$7,691,232	$3,076,494
SIFER (Stable Isotope Facility for Ecosystem Research) - Tracking Fluxes One Molecule at a Time	The Stable Isotope Facility for Ecosystem Research will pioneer research applications in ecosystem biogeochemistry and biodiversity and will trace the fate of nutrients and chemical pollutants through soils, plants, wildlife, and water resources in order to improve sustainable ecosystem management.	Sylvie Quideau	University of Alberta	$3,756,978	$1,478,111
Towards a Compact Light Source: A Dedicated Laser Wakefield Accelerator Endstation for Canada	The project will enhance the Advanced Laser Light Source in Varennes, Québec, with the goal of achieving a compact laser-based synchrotron improving access to this technique. The proposal builds on the Canadian Light Source and the National Institute for Nanotechnology, advancing Canada's capacity in advanced materials. The application of such technology has wide ranging implications for energy, health, and value-added materials.	Emil Hallin Robert Fedosejevs	University of Alberta	$1,358,600	$41,499

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Enhancing the Spectromicroscopy Beamline and Endstations at the Canadian Light Source	The project will enhance the global scientific and technological leadership of the Canadian Light Source. The upgrades will expand the facility's role in advanced materials development (fuel cells, magnetic devices, strained semiconductors, biomedical implants) and establish new capabilities in imaging and analysis of cryo-cooled samples.	Stephen Urquhart Arthur Mar	University of Alberta	$4,100,000	$250,000
An Integrative Approach for Translating Research to Improve Musculoskeletal Health	A musculoskeletal research centre will be established at the McCaig Institute for Bone and Joint Health that will complete an innovative knowledge transfer pipeline connecting basic and clinical research with partners embedded in Alberta's health system. The centre will provide rapid implementation of novel musculoskeletal health care solutions for every Albertan.	Stephen Boyd	University of Calgary	$12,889,750	$4,739,000

Research Infrastructure Stream
Infrastructure Sustainability Stream
2009-2013

Number of Projects:	7
Total Cost of Projects:	$60,448,995
Approved RCP Funding:	$19,071,267

Alberta Research Capacity Program Projects

Small Equipment Grants Stream

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
A Facility for Innovative Hydrocarbon Energy Research	Drs. Song, Abedi and Husein will use their RCP infrastructure award to investigate the efficient use of natural gas to upgrade heavy oil and biomass for high value-added chemicals and / or fuel production for industrial and transportation applications, as well as char formation for wastewater treatment.	Hua Song, Jalal J. A. Abedi, Maen M.H. Husein	University of Calgary	$377,520	$130,000
A Mitochondrial Research Unit	Dr. Michelakis's RCP funded infrastructure will support an intense, well-funded and sustainable translational research program in which investigators will discover new ways to diagnose and treat pulmonary hypertension, a deadly disease of the lungs, improving the health of Albertans.	Evangelos D. Michelakis	University of Alberta	$1,000,000	$400,000
A State-of-the-Art Facility for Assessing Environ- mental Stress and Fish Health	The RCP funded infrastructure will allow Dr. Vijayan to set up an internationally recognized research program to tackle environmental pollution. The program will be at the forefront of environmental genomics research and will lead to the development of molecular biosensors as early warning signals to predict population levels damages and generational impacts.	Mathilakath Vijayan	University of Calgary	$828,388	$331,227
Aeolian Processes and Landscape Dynamics Laboratory	Dr. Hugenholtz's RCP awarded infrastructure will support basic and applied research regarding aeolian (wind) transport of particles, with a major applied focus on air quality in the oil sands. A portable wind tunnel and small unmanned aircraft system will be used to develop functional predictions of aeolian processes in support of mitigation and management.	Chris Hugenholtz	University of Calgary	$297,724	$118,147
An Integrated System for High Resolution Terradynamic 3D Imaging	The RCP infrastructure award will allow Drs. Hopkinson, Chasmer and Jiskoot to develop a high-resolution terradynamic monitoring system (HRTMS). The HRTMS will be used for 3D monitoring of above- and below-ground environmental processes, supporting a range of important research questions related to climate change impacts, natural resource management, anthropogenic disturbance and land reclamation.	Christopher Hopkinson Laura Chasmer, Hester Jiskoot	University of Lethbridge	$613,690	$245,476

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Analytical Tools for Elucidating the Mechanisms of Catalytic Reactions	Chemical catalysis is the phenomenon by which a catalyst makes a chemical reaction occur with more efficiency and selectivity. The RCP funded infrastructure will allow Dr. Piers to acquire modern tools for analysis of catalyzed chemical reactions at an atomic level of detail will aid in the discovery and development of new catalysts for clean energy applications.	Warren Edward Piers	University of Calgary	$999,952	$381,513
Bioreactor Derived Induced Pluripotent Stem Cells for Diagnostic and Therapeutic Application	This project will support Drs. Rancourt, Gerull and Dobrinski's research program related to the derivation of induced pluripotent stem cells in stirred suspension bioreactors at the University of Calgary. The RCP funded infrastructure will facilitate patents being filed, and will see the technology applied toward the generation of human and pig cardiac myocytes for experimental, diagnostic, and therapeutic purposes.	Derrick E. Rancourt, Brenda Gerull Ina Dobrinski	University of Calgary	$416,591	$166,637
Characterization of the In Vivo Pulmonary Immune System in Mice Through the Development of Novel Surgical and Advanced Imaging Technologies	Respiratory diseases due to infections and inflammation contribute a disproportionate burden of illness and economic cost to Albertans and Canadians. From his RCP infrastructure award, Dr. Yipp's lab will develop new technologies capable of directly watching the lung immune cells fight off infection and generate inflammation in order to develop new therapeutic strategies.	Bryan Yipp	University of Calgary	$914,860	$356,669
Clinical and Experimental Echocardiographic Imaging Equipment	Dr. Becher's RCP funded infrastructure will support a program to overcome the limitations of current ultrasound imaging in patients with atherosclerosis and heart disease. In order to improve the cost-effectiveness and reliability of available ultrasound equipment, software for processing ultrasound recordings and new short imaging protocols will be developed.	Harald Becher	University of Alberta	$480,000	$192,000
Dissecting Chronic Pain and Opioid Analgesia: From Genes to Cells to Behaving Animals	Chronic pain is pervasive, insidious, and afflicts 1 in 5 Canadians. Treating pain in these individuals is notoriously difficult because current therapies are either ineffective or have intolerable side effects. Dr. Trang's RCP infrastructure award will support leading edge research into understanding the causes of chronic pain and the design of new therapies.	Tuan Trang	University of Calgary	$556,864	$210,000

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Establishment of a Pediatric Nervous System Cancer and Development Laboratory	Childhood brain tumours and brain development are biologically linked. Consequences to the developing brain occur when treating pediatric brain cancers with radiation or chemotherapy. Dr. Eisenstat's RCP research infrastructure will improve understanding of brain development and show how current cancer treatments affect the developing brain, leading to new therapies that reduce treatment complications.	David Eisenstat	University of Alberta	$429,998	$172,000
Establishment of an Equine Embryology Laboratory with an Emphasis on the Physiology of Early Equine Pregnancy and the Epigenetic Effects of Assisted Reproductive Techniques	Dr. Klein's RCP funded infrastructure will focus on the physiology of early equine pregnancy which will result in a better understanding of and novel treatment options for embryonic loss and the epigenetic consequences of assisted reproductive technologies. The information is of importance to horse owners pursuing cloning and also to couples affected by infertility.	Claudia Klein	University of Calgary	$283,965	$111,835
Genetic Determinants of Respiratory Syncytial Virus Pathogenesis	The RCP award will allow Dr. Marchant to acquire next-generation sequencing, virus culture and imaging infrastructure to support the development of a system to monitor Respiratory Syncytial Virus (RSV) spread and virulence in the community. The analysis of the data will go toward understanding how RSV mutates from year to year and will aid in antiviral drug development.	David Marchant	University of Alberta	$288,001	$115,201
Imaging the Universe in the Far-Infrared	The RCP infrastructure award will develop a laboratory-based Far-Infrared (FIR) spatial/spectral Fourier interferometer. This instrument will allow Dr. Spencer to support component development, observing techniques, and data processing of upcoming balloon and space based astrophysical instrumentation trials. The project is in collaboration with an international consortium dedicated to the development of a space-based FIR Interferometer mission.	Locke Spencer	University of Lethbridge	$290,569	$116,228
Infrared Spectral Signatures of Chirality, Chirality Recognition and Ion-Neutral Reactions	Drs. Xu and Jaeger's RCP infrastructure award will facilitate a new platform technology that is critical for advancing our innovative research programs in chirality recognition and in ion-neutral reactions. This technology will benefit a broad spectrum of other research programs in high priority areas for Albertans, such as glycomics and water quality.	Yunjie Xu Wolfgang Jaeger	University of Alberta	$1,000,000	$400,000
Infrastructure for Nano- scale Characterization of Materials / Structure for Energy Conversion and Storage Devices	Dr. Karan's RCP infrastructure award will support research on the development of energy conversion and storage technologies. High efficiency conversion of carbon-rich fuels (natural gas) in fuel cells and low-cost, large volume energy storage in flow batteries can revolutionize the usage of Alberta's rich non-renewable and renewable resources.	Kunal Karan	University of Calgary	$553,750	$216,000

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Infrastructure for Next Generation High-Throughput Computational Genomics	The ability to determine individual "personal" human genome sequences is transforming life sciences and health research. The "DNA deluge", however, imposes daunting computational challenges that are preventing effective clinical utilization of genomic data. Dr. de Koning's RCP funded infrastructure will support research into new algorithms with the potential to overcome these barriers.	A.P. Jason de Koning	University of Calgary	$291,523	$116,609
Infrastructure for Process, Fabrication and Characterization of Functional Nanomaterials and Devices for Sustainable Energy	Sustainable energy includes renewable energy technologies, and new technologies to reduce current energy consumption. Dr. Wang's infrastructure award will be used to process and characterize functional nanomaterials, such as semiconductor colloidal quantum dots, and to fabricate and characterize optoelectronic devices for solar energy harvesting and high-efficiency lighting.	Xihua Wang	University of Alberta	$215,358	$80,000
Integrated Metagenomics for Energy Bioengineering	The energy and mining sectors are a vital part of the Alberta economy with many opportunities for further development. Dr. Strous's RCP infrastructure award aims to maximize control of biological processes by integrating metagenomics into engineering and geochemical practice. Potential applications are renewable energy, efficiency improvements, counteracting greenhouse gas emissions, and environmental monitoring.	Marc Strous	University of Calgary	$999,148	$399,205
Intelligent Wireless Technologies	Dr. Mousavi's RCP funded infrastructure will develop and commercialize intelligent wireless technologies for the technical advancement in Alberta's heavy oil industry. Development of ICT platforms, such as leading edge antenna, microwave and millimeter waves, will foster a strong collaboration between industry and academia in the research.	Pedram Mousavi	University of Alberta	$1,000,000	$400,000
Investigating Nanoparticle / Polymer Interactions for Novel Materials Design & Heavy Oils Treatment via Confocal Rheology	The unique RCP funded infrastructure enables Drs. Trifkovic and Sundararaj to investigates designs of new materials for diverse applications, including efficient hydrocarbon harvesting, faster reclamation of oil sands tailings, materials for energy storage systems, and development of scaffolds for tissue engineering applications. Mesoscale interactions between nanoparticles and polymers are crucial for material design and technology for applications in petroleum, petrochemical, and biomedical industry.	Milana Trifkovic, Uttandaraman Sundararaj	University of Calgary	$429,827	$150,000

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Laboratory Infrastructure Investigating the Antibiotic Resistance of Campylobacter	Campylobacter is a leading food-borne pathogen in Canada and other countries. Dr. Jeon's RCP award will investigate antibiotic resistance of Campylobacter and develop novel gene-based methods to inhibit antibiotic resistance. The outcomes will contribute to food safety and public health in Alberta and beyond.	Byeonghwa Jeon	University of Alberta	$479,373	$191,749
Millimeter-Wave Facility (mmWF)	The RCP funded infrastructure will allow Dr. Belostotski to establish a laboratory to research and demonstrate the commercial potential of an terahertz imaging systems (THz) with possible applications in biomedical imaging, security screening, broadband communication and the investigation of atmospheric dynamics, such as ozone depletion, pollutant distribution and global warming.	Leonid Belostotski	University of Calgary	$496,343	$198,537
Molecular Study of Host Microbial Interactions	Dr. Willing's project aims to understand the mechanisms through which the population of microbes in the gastrointestinal tract shape how humans and animals respond to diet. The new infrastructure will provide capacity to study this relationship in vivo and in vitro as well as the molecular tools to characterize microbial communities and host responses.	Benjamin Willing	University of Alberta	$400,000	$160,000
Multimodal High Throughput 3D Biomedical Imaging Laboratory	The RCP Infrastructure award will enable the addition of a benchtop MRI to an existing suite of imaging modalities, enabling development of new tools for modeling rapid detection of abnormal bio- logical shapes. Drs. Jamniczky, Hallgrimsson and Rolian's research into animal models of common human shape-related diseases and dysmorphologies will offer physicians new approaches to improve quality of life.	Heather Jamniczky, Benedikt BH Hallgrimsson Campbell Rolian	University of Calgary	$590,769	$236,308
Pharmacogenetic Translational Biomarker Discovery	Drs. Aitchison, Halloran, and Somerville will use their RCP funded infrastructure for a translational pharmacogenomics research program using high- throughput genetic analysis of variation in DNA to identify biomarkers. This will influence a range of health care outcomes including progression to illness and response to treatment and enable the provision of appropriate health care interventions, improve health outcomes, and reduce costs.	Katherine Aitchison Philip Halloran Martin Somerville	University of Alberta	$694,961	$277,985

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Physiological and Oxygen Sensing Suite for Ex Vivo and In Vivo Studies	Current treatments for heart disease and heart failure focus on either improving oxygen delivery to the heart or slowing heart rate to reduce oxygen demand. Drs. Lopaschuk and Dyck will use their RCP funded infrastructure for a research approach that focuses on making the heart more efficient at using oxygen and thus may lead to improved treatment options for these patients.	Gary Lopaschuk Jason Dyck	University of Alberta	$395,974	$158,334
Polymer Reaction Engineering and Characterization Research Facility	Tailings management and water recycling are essential for the sustainability of the Alberta oil sands industry. Dr. Soares's RCP funded infrastructure will develop advanced polymer flocculants specifically designed for these applications. The polymer manufacturing and characterization facility aims to solve one of the most challenging problems in the oil sands industry.	João B. P. Soares	University of Alberta	$999,756	$399,903
Prion Diseases: From Cellular Biology of Prion Infection to Novel Therapeutic Approaches	Prion diseases are fatal and infectious neurodegenerative disorders of humans and animals. They can be transmitted between species, and currently no therapy is available. Dr. Gilch's RCP infra- structure award will be used to establish a highly competitive prion disease research program with outcomes relevant for Alberta.	Sabine Gilch	University of Calgary	$373,805	$149,522
Synovial Mesenchymal Stem Cells: Distinct Roles in Cartilage Regeneration and the Pathogenesis of Osteoarthritis	Dr. Krawetz will use his RCP infrastructure award to focus on translating synovial stem cells from the bench to the bedside. His group is uncovering why the inflammatory response with injury or arthritis inhibits stem cells from repairing cartilage, and will develop approaches to circumvent this cycle so patients suffering from injury or arthritis will not require invasive surgical intervention.	Roman Krawetz	University of Calgary	$946,650	$271,525
The Virtual Team Performance, Innovation and Collaboration Laboratory	Drs. O'Neill and Lee will use their RCP award to build and equip a state-of-the-art multi-room laboratory in order to advance knowledge of virtual team effectiveness. Virtual teams are groups of individuals who share a common objective but who often communicate through electronic media (videoconference, teleconference), and they are used extensively by Alberta organizations.	Thomas O'Neill Kibeom Lee	University of Calgary	$515,826	$170,000
Thermodynamics Laboratory for Applied High-Pressure Sour Fluids Research	The RCP funded infrastructure in Dr. Marriott's laboratory for applied high-pressure sour hydro- carbon research include reservoir fluid chemistry, separation technologies, conditioning to reduce water, recovery of elemental sulfur and injection of elemental sulfur or H2S/CO2. This research will reduce costs of bringing hydrocarbon to market, while maintaining low SO2/CO2 emissions.	Robert Marriott	University of Calgary	$725,240	$273,800

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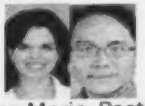
Translational Research Centre to Target and Characterize Normal and Cancer Stem Cell Niches	Drs. Postovit and Lee will use their RCP infrastructure award to develop better ways to treat female cancers. The infrastructure will allow the researchers to better understand and target aggressive cancer cells and will lead to better treatments for cancer patients.	 Lynne-Marie Postovit Cheng-Han Lee	University of Alberta	$475,243	$190,098
Transport in Micro/Nanoscale Environment	This project focuses on understanding and quantifying mechanisms of macromolecule transport through nanoporous matrices. Recovering much of Alberta's vast heavy oil depends on details of the mass transfer of oil, polymer, and solvent through porous reservoirs. Dr. Nazemifard's RCP funded project will quantify and further optimize the recovery processes using custom nanoporous matrices.	Neda Nazemifard	University of Alberta	$200,000	$80,000
Wastewater Toxicity in Hydraulic Fracturing for Natural Gas	Hydraulic fracturing for natural gas creates several environmental concerns, including the use of vast quantities of freshwater, and the creation of potentially hazardous flowback wastewaters. Dr. Alessi's RCP funded research program aims to uncover conditions that lead to toxicity in flowback, and to identify alternative, near-fresh groundwater sources for hydraulic fracturing in Alberta.	Daniel S. Alessi	University of Alberta	$299,222	$88,000
Whole-body Mouse Microscope for Imaging Multi-Organ Response to Injury	The whole-body microscope is a unique research tool for imaging pathological changes occurring simultaneously in the entire body of small experimental animals in response to injuries/ill- nesses. Dr. Cernak's RCP award will develop and test novel diagnostics and therapies to mitigate the long-term consequences of injuries.	Ibolja Cernak	University of Alberta	$513,939	$205,575

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A Slimline Borehole Seismic System for Geophysical Imaging and Monitoring of Induced Seismicity: Applications in Scientific Drilling, Mine Safety, Carbon Sequestration, and Hydrocarbon Extraction	The Slimline Borehole Seismic System infrastructure at the University of Alberta will allow researchers to obtain both active and passive seismic data at depth in the earth. The data will be used in numerous different drilling applications both in Alberta and globally to assist in the development of geothermal energy, conventional and unconventional hydrocarbon resources, minerals, and carbon sequestration.	Douglas R. Schmitt	University of Alberta	$833,309	$325,000
ABOVE: An Array for Broadband Observations of VLF/ELF Emissions	Using the RCP funded infrastructure, researchers will deploy an array of radio instruments across Western Canada to study a region of near-Earth space known as the radiation belts. This capitalizes on Western Canada's unique geography to complement recently-launched and future international space missions. The developed technology will serve as a basis for future spaceflight instrumentation.	Christopher Cully	University of Calgary	$697,173	$253,444
An Image-Guided Small-Animal Irradiation Facility for Precise Targeted Delivery of X-Rays to Specific Regions of Tumors and Normal Tissues	"Image-guided" radiation therapy (IG-RT) is one of the innovative new treatments available to cancer patients. The RCP funded infrastructure will enable, for the first time, preclinical assessment and investigation into dosing and combination therapies for IG-RT. These studies could provide improved outcomes for cancer patients and cost saving for the healthcare system.	David Murray	University of Alberta	$816,204	$326,241
Analysis of Intracellular Protein Trafficking and Organelle Biogenesis	The Wozniak, Rachubinski, and Melançon laboratories study the structure and biogenesis of cellular membranes and organelles and focus on analysis of the nuclear envelope membrane, peroxisomes, and the Golgi complex. Defects in each of these membrane systems can have catastrophic health consequences, including developmental and neurological disorders, cancer, and heart disease. The new infrastructure will enable cell biological experiments that cannot be performed with the current instrumentation.	Richard Wozniak Paul Melancon Richard Rachubinski	University of Alberta	$832,540	$333,016

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Application to Establish a Neurovascular Translation Research Laboratory	The project infrastructure will equip a Translation Neurovascular Laboratory at the University of Alberta. The laboratory will carry out stroke and aneurysm studies in large animal models focusing on new treatments with the types of coils, stents, flow diverters, and thrombus retrievers used in human medicine. Cerebral aneurysms, prevalent in approximately 2% of the population, are a significant cause of morbidity and mortality, causing death or permanent disability in up to 60% of patients when they rupture.	Tim E. Darsaut Cian O'Kelly	University of Alberta	$399,636	$159,854
Aquatic Conservation and Fisheries Management Research Laboratory	The RCP funded infrastructure will create a new Aquatic Conservation and Fisheries Management Laboratory at the University of Alberta. The laboratory will engage in research on the conservation and restoration of aquatic ecosystems including the capture and measurement of aquatic organ- isms, analysis of age and growth relationships, measurement of environmental conditions, and field research.	Mark Poesch	University of Alberta	$339,090	$135,000
Center for Pure and Applied Thermochronology (CPAT)	The project infrastructure will enable the development of Canada's first state-of-the-art low temperature, helium isotope, thermochronology center. This facility will focus on driving innovative thermal evolution and tracer research, impacting several key strategic research priority areas including: environment, energy, and carbon capture and storage.	Bernard Guest Andrew Leier Stephen Larter	University of Calgary	$1,271,983	$508,793
Characterization of Shale Gas and Shale Oil Reservoirs	The RCP funded infrastructure will develop integrated geological and petrophysical models for understanding and predicting reservoir performance in shale gas and shale oil resevoirs. The equipment complements existing infrastructure at the University of Alberta and is capable of measuring permeability down to 1 nanodarcy.	Nicholas B. Harris	University of Alberta	$364,055	$120,000
Cognitive and Neural Mechanisms of Language and Working Memory	The new infrastructure will provide state-of-the-art eye-tracking (ET) and electroencephalographic (EEG) recording systems that will be used to examine language and cognition in adults with and without brain impairments. This equipment will provide insight into the mental processing (ET) and brain regions (EEG) involved in language and working memory.	Esther Kim Jacqueline Cummine Ada Leung	University of Alberta	$121,227	$40,000

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Deciphering the Molecular Mechanism(s) of mRNA Export	DNA stores the instructions governing life, which must be shared with the rest of the cell. Failure to properly share this information has disastrous consequences including the onset of various human diseases. This project will study how such a change in information flow contributes to human diseases such as cancer, motor neuron syndromes, and sudden early cardiac arrest.	Ben Montpetit	University of Alberta	$450,000	$180,000
Development of an Infrastructure for the Investigation of New Technologies for Traffic and Transportation Applications	Congestion, fatalities and injuries due to accidents, emissions, and air pollution are all consequences of higher urban and rural travel demands. The new infrastructure will create two testbeds located in Edmonton (one along outer ring road, Anthony Henday Drive, and another along two main arteries, Whitemud Drive and Yellowhead Trail) and a traffic data centre at the University of Alberta. These facilities will develop and evaluate new traffic monitoring and management technologies.	Zhi-Jun Qiu	University of Alberta	$329,928	$126,311
Digital Imaging of the Brain's Anatomy: Experimental and Comparative Approaches	The RCP funded infrastructure will enable the development of a unique, state-of-the-art digital imaging facility in Canada dedicated to under- standing the anatomy of the brain. By using a high-resolution slide scanner, researchers can pro- vide high resolution images throughout the entire brain, thus allowing other researchers to reanalyze and reinterpret experimental results.	Andrew N. Iwaniuk	University of Lethbridge	$329,062	$131,634
EEG Laboratory for the Study of Neural Network Reorganization	The state-of-the-art EEG and imaging analysis laboratory at the University of Calgary will be used to identify phenomena that characterize individual differences in functional resilience, and the capacity to predict the optimal treatment for individuals with brain disorders such as epilepsy and depression.	Andrea Protzner	University of Calgary	$237,675	$95,070
Electrophysiological Recordings and Calcium Imaging of Pain-Sensing Neurons in Inflammatory Conditions	Using a combination of molecular biological, electrophysiological, imaging and behavioural assessment techniques, the infrastructure will enable researchers to assess the role of pore proteins in the membrane of nerve cells that detect pain signals, and to understand how aberrant function of these proteins is regulated in inflammatory disease conditions.	Christophe Altier	University of Calgary	$131,795	$52,718

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Endocannabinoid Signaling as an Endogenous Regulator of Stress and Anxiety	The neural mechanisms through which stress influences vulnerability to mental illness are not well understood, but involve structural and functional reorganization of neural circuits in the brain. This project aims to understand how the endocannabinoid system regulates vulnerability and resilience to mood and anxiety disorders.	Matt Hill	University of Calgary	$809,710	$323,884
Facility for Functional Genomic Analysis of Oncolytic Viruses (FGOV)	Viruses that selectively seek and destroy cancer cells provide innovative candidates for cancer therapy. RCP funded infrastructure at the Facility for Functional Genomic Analysis of Oncolytic Viruses (FGOV) will apply the latest genomic approaches to reveal new cellular and viral genes that can be fine-tuned to improve the therapeutic efficacy of cancer-killing viruses.	Maya Shmulevitz	University of Alberta	$441,382	$176,553
Infrastructure for Characterization of Shape Memory Polymer Composites and Nano-Composites with Complex Fiber Architectures for Multifunctional Composite Materials Research	The project focuses on thermo-mechanical characterization and analysis of multifunctional composite and nano-composite materials that will enable their broader use and commercialization. Shape memory materials are advanced materials that can store a temporary shape and restore their original shape upon application of an external stimulus, such as heat and are most commonly used due to their lightweight, relatively higher strain recover- ability, easier tailorable properties, and manufacturability.	Cagri Ayranci	University of Alberta	$191,716	$60,000
Infrastructure for Investigating the Link Between Chronic Oral Inflammation and Systemic Health	The RCP funded infrastructure is essential to the work by three investigators who will examine how long-term inflammation in the mouth affects the heart and brain. This research will result in new therapies to reduce the burden of oral and systemic diseases which affect over 90% of the world's population.	Ava K. Chow Maria Febbraio Patrick Flood	University of Alberta	$499,920	$199,969
Infrastructure to Develop a Clinical Cardiopulmonary Physiology Laboratory to Examine the Cardiovascular Consequences of Chronic Obstructive Pulmonary Disease	The new infrastructure will be used to develop a clinical research laboratory examining cardio- vascular diseases in patients with chronic lung disease. The work will look at the mechanisms that may explain why patients with lung disease develop cardiovascular disease, as well as the impact of possible treatments.	Michael K. Stickland	University of Alberta	$878,715	$351,486

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Infrastructure to Investigate Emerging Biological Threats in Canadian Boreal Forest Ecosystems and Integration with Chemical Ecology	The new infrastructure will enable the exploration of questions of broad relevance to the invasion of jack pine forests by the mountain pine beetle and climate change. Specifically, the program goal is to understand the biological and abiological factors affecting the invasion dynamic, such as tree resistance, competition or climate change, and to provide management opportunities for intervention where direct management is appropriate.	Nadir Erbilgin	University of Alberta	$227,485	$90,994
Integrated Photonics	The RCP funded infrastructure will facilitate a research-driven technology development program to design, prototype, and test sensors with better performance and more functionality by designing light sources and optical filters that can be integrated on microchips. Miniaturization of these systems would significantly increase their utility in the field (e.g., gas detection in oil drilling; CO2 detection) and clinics (e.g., skin cancer detection) as part of a portable hand-held sensor tool kit.	Orly Yadid-Pecht	University of Calgary	$272,281	$100,000
Knowledge Transfer and Utilization of Evidence- Based Psychosocial Treatments	The RCP funded infrastructure will provide for an innovative facility to develop, evaluate and disseminate evidence-based psychosocial treatments. The focus of the work is on standards for development and evaluation of treatments for mental health disorders, and their transfer into applied settings and utilization.	Keith Dobson David Hodgins Candace Konnert	University of Calgary	$378,407	$151,363
Laboratory for Novel Vascular Anti-Inflammatory Therapies	The new infrastructure will support the development of the Laboratory for Novel Vascular anti-Inflammatory Therapies where the development and treatment of vascular diseases such as atherosclerosis are investigated. These studies will be carried out in conjunction with critical biochemical analyses performed in the adjacent MacDonald laboratory, and are aimed at discovering improved methodologies to predict and treat premature and "silent" blood vessel inflammation in young Canadian adults.	Ed O'Brien	University of Calgary	$984,318	$393,727

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Laser Illumination, Photo-Bleaching and Na- no-Positioning Systems to Facilitate Live-Cell Imaging of Biomolecule Regulation	The new infrastructure will update and enhance the live-cell imaging instrumentation used in a large number of collaborating laboratories at the University of Alberta. This enhancement will enable the development of technology that will provide new abilities to study the basic pathways of mRNA regulation linked to multiple diseases.	Andrew J Simmonds	University of Alberta	$252,853	$101,141
Low Stress Animal Behavioral Suite for Investigation of Neuropathic Pain and Other Neurological Disease	The RCP funded infrastructure will establish and equip a state-of-the-art animal behavioral suite at the University of Alberta. The unique organization of this facility will provide an unprecedented level of information pertinent to the treatment of chronic pain, multiple sclerosis and other neurological diseases. The facility is expected to increase both academic and industrial research investment in Alberta.	Peter A. Smith	University of Alberta	$401,383	$160,553
Microbial Genomics and Evolutionary Cell Biology Suite	The new infrastructure will allow the Dacks lab at the University of Alberta to use genome sequencing to explore the range and diversity of cell biology to understand issues of health, the environment, and the origins of the human cell.	Joel Bryan Dacks	University of Alberta	$447,478	$178,991
Millimeter-Wave Radio Facility	The infrastructure will establish a new facility that supports the development of low-energy consumption Gbps mm-wave radios for wireless and satellite communications. This facility will also be valuable to researchers using mmwave electronics to develop high-resolution imaging technologies for medical, remote sensing and security screening purposes and related applications.	Fadhel Ghannouchi	University of Calgary	$949,974	$379,990

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Multimedia Object Research Platform Host for Adaptive and Mobile Learning	The customized novel infrastructure provided by the RCP grant will enhance the technology-based learning environment at Athabasca University. The project will enable researchers to study the emerging structures of user-generated content and the dynamic interaction patterns of users for adaptive and personalized learning, in the context of desktop-based and mobile settings.	Sabine Graf Dragan Gasevic Vivekanandan Kumar	Athabasca University	$933,854	$357,539
Multinuclear NMR Facility for Multiphase Materials Science	The multinuclear NMR infrastructure will enable research in diverse fields of chemistry and neighbouring sciences by providing cutting-edge characterization tools for polymer science, catalyst research, fluorination methods, petrochemistry, biochemistry, agrochemistry, and neuroscience.	Paul Hazendonk Michael Gerken Paul Hayes	University of Lethbridge	$1,599,114	$639,645
Muscle Cell Imaging Infrastructure for Development of Novel Molecular Therapy for Muscular Dystrophies	Muscular dystrophies (MD) are a group of more than 30 genetic diseases characterized by progressive weakness and degeneration of skeletal muscle. The new research infrastructure will be used to focus on identifying molecular therapies for MD, especially in the promising field of antisense- mediated exon-skipping. This approach is unique in Canada and will aid in designing the best strategy of molecular therapy for MD.	Toshifumi Yokota	University of Alberta	$798,015	$319,206
Protein Quality Control Analysis in Health and Disease	Aiming to achieve significant results in preventing, treating, and ending many protein folding disorders including Alzheimer's, Parkinsons, and others, the new infrastructure will enable the analysis of protein quality control in health and disease, and the identification of protein binding partners and interacting molecules.	Marek Michalak	University of Alberta	$975,325	$390,129
Quantitative High Speed Stereo Video-Fractography System	New materials development is reliant upon understanding failure, and its circumvention. The RCP funded infrastructure will build a high speed camera system to capture, and measure, never before seen failure events in materials research. Subsequent research projects may enhance cur- rent collaborations between Alberta Innovates and Campus Alberta in an effort to develop, build, and diversify the economy.	John A. Nychka	University of Alberta	$315,592	$125,000

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Research Supporting the Understanding of Infectious Disease Caused by Biofilms	The project infrastructure will support state-of-the- art research that seeks to understand the process of infectious disease caused by biofilms. Biofilms are slime-covered microbe communities that stick to each other and to surfaces; they account for many chronic infections that defeat the immune system and are highly resistant to antibiotic therapy.	Joe Harrison	University of Calgary	$687,084	$272,828
Smart Power Distribution Grid Laboratory	The project will develop a Smart Electric Power Distribution System Research Facility at the University of Alberta. This new infrastructure will facilitate a powerful experimental setup needed to validate research results in the emerging area of renewable and clean energy systems.	Yasser A.R.I. Mohamed	University of Alberta	$196,221	$60,000
The Human DNA Repair and Chromatin Dynamics High Resolution Imaging Laboratory	The RCP funded grant will further the development of high-resolution microscopy capabilities at the Southern Alberta Cancer Research Institute and carry out research into how human cells respond to DNA damage caused by prevalent environmental carcinogens. Researchers will also develop practical methods for determining the sensitivity of Albertans to radiation or chemotherapy prior to treatment.	Aaron Goodarzi	University of Calgary	$374,695	$149,877
Translational Pathology Unit	To close the gap between discoveries and clinical application in diagnostics, the RCP funded equipment will complement existing infrastructure and form a state-of-the-art Translational Pathology Unit within the Li Ka Shing HRIV Centre at the University of Alberta.	Michael Mengel Judith Hugh	University of Alberta	$463,087	$185,236
Visualization of Trans- plant Biology	Patients with organ failure frequently receive a replacement organ via transplantation. Despite immunosuppressive drug therapy, the transplants deteriorate through chronic rejection. With the infrastructure, researchers at the University of Alberta will seek to understand and prevent this deterioration utilizing new technologies that track thousands of molecules and cells important in rejection.	Colin Anderson Allan Murray Lori West	University of Alberta	$846,836	$313,200

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Advanced Analytical Facility for Environmental Soil Research	Addressing important environmental issues such as land reclamation and ground water contamination associated with the oil sands and petroleum industries, the research of Drs. Siddique and Dyck will assist in the development of science-based management systems to protect our natural resources, and will provide the fundamental knowledge required to devise better strategies for sustainable in-situ clean-up and management of contaminated sites in Canada.	Tariq Siddique Miles Dyck	University of Alberta	$555,024	$216,460
An Ultra-Sensitive Device for Measuring and Imaging Trace Radioactive Impurities in Materials for Dark Matter Searches	Housed in the Centennial Centre for Interdisciplinary Science, the BetaCage instrument provides ultra-pure materials and instrumental sensitivity to identify trace elements in samples – services that are essential to the continued development of a world-class centre that can serve the needs of international researchers. For example, this equipment will provide a distinct advantage for the new projects at SNOLAB, the world's premier deep underground laboratory with research focused on neutrino physics and Dark Matter searches.	Darren Grant	University of Alberta	$299,999	$120,000
Canada's Arctic Cratons, Kimberlites and Diamonds	The infrastructure will bring the first multi-ion counting TIMS instrumentation to Canada and will open up new fields of geochemistry. This research will produce important results on exploration samples, allowing early targeting of potential deposits. These and other data will be integrated into Dr. Pearson's Canada Excellence Research Chair research program objective to produce a 4-D model of Canada's Arctic mantle that will aid not only diamond exploration, but also the search for metals and oils.	Graham Pearson Thomas Stachel Larry Heaman	University of Alberta	$2,000,000	$800,000
Capacity Building in Vision Research to Prevent Blindness	Vision loss causes a profound sense of despair and disability and creates long-term costs for society and a poorer quality of life. The research of Drs. MacDonald, Lehmann and Sauve aims to improve the vision health and well-being of Albertans. This infrastructure will build on international research excellence in ocular genetics, providing an opportunity to undertake innovative gene therapy research protocols. It will also build capacity for basic vision research and future innovative clinical trials to prevent blindness.	Ian MacDonald Ordan Lehmann Yves Sauve	University of Alberta	$467,117	$186,846

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Creation of a Laboratory to Study the Role of the Hsp90 Chaperone in Cancer	Building on existing strengths in cancer research, this project is aimed at characterizing and exploiting molecular changes that occur very early in the development of cancer. This knowledge will make diagnostic and therapeutic advances possible for the treatment of not only cancer, but also cystic fibrosis, diabetes, and neurodegenerative and age- related diseases.	Paul LaPointe	University of Alberta	$833,075	$59,358
Defining New Roles for Bcl-2 Family Members in Breast Cancer: Implications for Improved Treatment Options and Novel Therapies	The infrastructure will allow Dr. Goping to investigate breast cancer with a focus on developing new targeted therapies, and will be instrumental in efforts to develop more personalized treatment plans for cancer. These studies will be used to develop diagnostic tools that will guide the discovery and development of treatment and drug regimes.	Ing Swie Goping	University of Alberta	$481,435	$192,574
Development of Tools and Techniques for Physical and Chemical Characterization of Oil Sand Interfaces	Dr. Thundat, the Canada Excellence Research Chair in Oil Sands Molecular Engineering, will develop a suite of instruments and techniques for understanding and controlling fundamental processes occurring at the interfaces between fluids and solids in the oil sands. Manipulation of these interactions, combined with sensors to continuously detect surface composition, will enable the development of improved, environmentally friendly and cost-effective techniques for extraction, upgrading, and reclamation of tailings.	Thomas Thundat	University of Alberta	$2,000,000	$800,000
Dissection of Wood Cell Wall Chemistry and Aquaporin Location Using Confocal Microscopy	Climate change is considered to be a major challenge for the future management and conservation of the boreal forest. This research will help us better understand how trees cope with environ- mental stress, particularly drought and freeze-thaw cycles, and is an important step toward introducing drought-resistant species into the landscape. Additionally, this work will contribute to diversifying fiber products and enhancing the potential to establish fast-growing trees on marginal agricultural land.	Uwe Hacke	University of Alberta	$160,250	$64,100
Experimental Facilities for the New Unsteady Fluid Mechanics Laboratory	Unique to Canada, the Unsteady Fluid Mechanics Laboratory will focus on accelerating the deployment of new renewable-energy technologies in Alberta. Among other future clean-energy technologies, the facility will produce state-of-the- art, laser-based measurement techniques which will improve the understanding of current wind- and water-turbine flow fields and lead to more efficient and cost-effective designs.	David Rival Robert Martinuzzi David Wood	University of Calgary	$299,679	$119,871

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Fluid-Flow Characterization of Unconventional Reservoirs	This infrastructure will enable Dr. Clarkson to describe and classify unconventional geological structures holding oil and gas resources and the flow of those resources when they are freed, as well as to develop techniques to extend lab developments into field testing. The new knowledge will help explore the potential to use the injection of carbon dioxide in unconventional reservoirs, and enhance hydrocarbon recovery and reduce greenhouse gas emissions, thereby contributing to assessments for economic potential and resource evaluation for carbon capture and storage.	Christopher Clarkson	University of Calgary	$316,055	$126,422
Generation of an Environmental Genomics System to Study the Evolutionary Consequences of Environmental Change in Canadian Freshwater Fishes	Dr. Rogers' research is at the forefront of environ- mental genomics, an emerging field that seeks to predict how organisms will respond, at the genetic level, to changes in the external environment. The long-term objective is to understand how ecology and evolution influence genetic variation in natural populations of freshwater fish, enabling organisms to respond to environmental change.	Sean Rogers	University of Calgary	$574,726	$229,853
Holocene Archaeology of Northeast Asia	The Baikal Archaeology Project (BAP), which focuses on the human-environment interactions of the Holocene Hunter-Gatherers in Northeast Asia, is comprised of a multidisciplinary team of scholars with expertise in archaeology, anthropology, geochemistry, molecular biology, geophysics, and environmental reconstruction. The BAP team is internationally recognized, works with collaborators of the highest caliber, and represents a top priority in the University of Alberta's internationalization strategy. The technological innovation of the program includes the creation of digital archives to ensure long-term virtual access for the international academic community and the public.	Andrzej Weber Fiona Bamforth Robert Losey	University of Alberta	$1,984,831	$793,932

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Infrastructure for Telerobotic and Biorobotic Systems Laboratory (TBSL)	The Telerobotic and Biorobotic Systems Lab will increase the acceptance of robotic/telerobotic assistance as the preferred approach to minimally invasive operations and cardiac surgery/telesurgery, rehabilitation/telerehabilitation, and percutaneous cancer therapy, and enable operating through several small incisions in the body, thus reducing patient morbidity and the length of hospital stay compared to open surgery.	Mahdi Tavakoli	University of Alberta	$446,806	$170,000
Infrastructure Resources to Allow the Application of Zebrafish Genetics to Understand Neural and Vascular Development	Drs. Kurrasch and Childs will explore zebrafish genetics to identify genes and gene networks involved in human neural and vascular diseases such as precocious puberty, obesity and genetic stroke, and aneurysm disorders. Potential long- term outcomes include the discovery of potential biomarkers to identify at-risk children for endocrine diseases and the commercialization of related diagnostic tests.	Deborah Kurrasch Sarah Childs	University of Calgary	$704,297	$245,720
Innate and Adaptive Killer Lymphocyte Responses	Viruses and cancer are significant causes of morbidity and mortality in Alberta and Canada. Development of effective immune system-based therapies and vaccines to prevent, or counter, infections and cancers are dependent on having an in-depth understanding of the molecular interactions controlling immune responses. Dr. Kane's research explores the contributions of subsets of lymphocyte cells in host defenses against infections and cancer.	Kevin Kane	University of Alberta	$971,485	$388,594
Innovative Research Infrastructure to Propel Implementation and Evaluation of Comprehensive School Health	The Population Health Intervention Research Unit focuses on the importance of healthy eating and active living in childhood, in part through developing school programs to prevent chronic diseases. The infrastructure will allow program evaluation and enable new research results to be tested and translated back to programming in participating schools and the public at large. The program will also be expanded into more remote and rural schools, including Northern, First Nations, and Métis communities.	Paul Veugelers	University of Alberta	$456,606	$175,399

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Instrumentation for Prospective Identification, Single-Cell Sorting and High-Resolution Imaging of Multipotent Dermal Stem Cells	The hair follicle, with its unique regenerative capacity and highly accessible location, is an ideal model system to study the mechanisms regulating adult stem cell behavior, tissue regeneration, and the potential therapeutic use for skin. By studying hair follicle stem cells Dr. Biernaskie aims to develop stem cell-based strategies to improve wound healing and tissue regeneration.	Jeffrey Biernaskie	University of Calgary	$736,621	$275,074
Integrated Field and Laboratory Infrastructure for the Development and Characterization of Road Materials and Pavement Performance for Cold Regions	Dr. Bayat will establish integrated field and laboratory infrastructure to better understand the effects of cold climate factors on pavement materials and the performance, characterization, and evaluation of recycled and waste materials for use in road construction. The research is aimed at developing sustainable practices and materials for road construction and creating value-added applications for recycled and waste materials, thereby increasing the lifespan and performance of pavements while reducing spending on road maintenance and waste material.	Alireza Bayat	University of Alberta	$637,357	$254,753
Laboratory for Investigation of Spatiotemporal Molecular Gradients in Biological Systems: Screening Infrastructure for Dynamic Molecular Tools, Materials, and Synthetic Extracellular Environments	Housed in the Centennial Centre for Interdisciplinary Science, and bringing a translational component to the Alberta Innovates Centre for Carbohydrate Science, the infrastructure will enable advanced investigation of membrane components, protein engineering and synthetic biology. The equipment will enable Dr. Derda to develop chemical tools to tackle biological responses and translational research of use to pharmaceutical and biomedical industries.	Ratmir Derda	University of Alberta	$572,396	$228,958
Laboratory for Monitoring the Pathogenic Potential of Environmental Bacterial Populations	The identification of genes likely to play a role in the emergence of pathogenic strains, monitoring their dispersal in nature, and describing the inter- actions between existing and emerging pathogens in the environment, are essential to allowing us to better predict and track potential outbreaks or epidemics. This facility will help Dr. Boucher's research program to detect the spread of human pathogens across the globe through molecular diagnostics.	Yan Boucher	University of Alberta	$262,524	$100,000

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Lipid Metabolic Disorders	Obesity is a serious health problem in Canada, putting individuals at risk for numerous medical conditions including cardiovascular disease, hyper- tension, type 2 diabetes, and Alzheimer disease. This infrastructure will ensure the continuation of important work on the identification of new bio- markers and pharmacological targets to improve these disorders and continue ground breaking research into discoveries and translation of the results into effective therapeutic applications.	Richard Lehner	University of Alberta	$990,393	$396,157
Microscopy Tools for the Study of Uterine Smooth Muscle Function in Hu- man Pre-Term Labour	Pre-term labour occurs in 10% of all births and is the leading cause of neonatal mortality and morbidity in Canada, with the highest incidence of occurrence in Alberta. Through collaborations with clinician scientists in obstetrics and gynecology, the primary focus of Dr. Slater's research is to understand the basic underlying mechanisms control- ling the onset of human labour, and to improve the prediction and treatment of premature labour.	Donna Slater	University of Calgary	$274,985	$109,994
Molecular Biology Laboratory for the Study of Metabolic Disorders	Dr. Jacobs' research program seeks to under- stand the complex interactions involved in chronic metabolic disorders. His work is focused on understanding the cellular, biochemical, genetic, and epigenetic mechanisms through which nutrition influences the development of obesity, dyslipidemia, and insulin resistance. The Molecular Biology Laboratory supports research to determine which nutritional, surgical, or pharmaceutical approaches could be used to improve or prevent these metabolic disorders.	René Jacobs	University of Alberta	$413,454	$165,382
Preparative Biochemistry Suite for the Study of the Ribosome as a Biomolecular Nanomachine	A detailed understanding of the dynamic properties and mechanisms inherent to the processes taking place in ribonucleoprotein assemblies will strongly contribute to unraveling the underlying design principles of biomolecular nanomachines, and will further the development of biomolecular engineering. This infrastructure will allow Dr. Wieden to study the mechanistic details and the functional and structural principles underlying protein synthesis.	Hans-Joachim Wieden	University of Lethbridge	$374,424	$149,766

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Preterm Birth: Prediction, Prevention and Technology Commercialization	The infrastructure will allow Drs. Olson and Mitchell to develop technologies to predict pregnant women at risk of preterm birth (PTB), to discover new disease mechanisms, and to test new treatments to delay PTB, prolong pregnancy, and improve maternal health. The new treatments resulting from this research program have strong commercial potential.	David Olson Bryan Mitchell	University of Alberta	$729,105	$291,642
Quantum Nanophotonics Laboratory (QNL)	The Quantum Nanophotonics Laboratory will house the world's most advanced system for probing nanoscale optical devices at low temperature, in order to study nanostructures embedded with a quantum optical system. Dr. Barclay's collaboration with the National Institute for Nanotechnology has the potential to increase the efficiency and capacity of sensing and computing technology, such as increased internet bandwidth and improved environmental scanning.	Paul Barclay	University of Calgary	$725,143	$290,057
Research Infrastructure for the Characterization of Interfacial Properties, Intermolecular and Sur- face Interactions in Soft Materials, Nanomaterials and Biological Systems	"Dr. Zeng's research team is interested in developing novel polymeric materials, thin films, and surfaces with extreme adhesion capability in dry and wet environments, a self-healing ability, and anti-fouling properties. This state-of-the-art atomic force microscope will be used to characterize advanced polymeric materials, nanomaterials, bio-materials and complex fluid systems with potential applications for oilsands pipelines, tailings water treatment, and waste treatment.	Hongbo Zeng	University of Alberta	$279,010	$100,000
Soil, Water, Air, Manure, Plant (SWAMP) Lab: Analytical Infrastructure for Studying Trace Element Cycling at Interfaces	Potentially toxic trace metals released to the environment from human activities can cause considerable environmental damage and ultimately impact human health. The SWAMP lab will house leading-edge equipment to aid the development of new environmental indicators and allow us to understand trends in environmental contamination. The research results will help to develop processes and policies with regard to water management, safe and secure drinking water, healthy aquatic ecosystems, and reliable quality water supplies.	William Shotyk	University of Alberta	$2,000,000	$800,000

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Super-Resolution Imaging of Virus-Host Interactions	Ribonucleic acid viruses, such as influenza and hepatitis C, cause the majority of virus-associated acute and chronic disease in humans, which have few treatment options, other than a limited number of vaccines. This new technology is poised to revolutionize our ability to view subcellular structures in 3D and will enhance our understanding of how they function, and how viruses disrupt their function. Through these studies we hope to devise strategies to block virus replication by interfering with their ability to take advantage of host cells.	Tom Hobman	University of Alberta	$1,000,000	$400,000
The Role and Discovery of Bioactive Small Molecules from Marine Microbial Communities	The marine environment is thought to be one of the richest sources of natural products. A range of antibacterial, antiviral, anticancer, and antifungal compounds have been isolated from both marine animals and plants. Dr. Case's laboratory aims to study these bioactive compounds at both the cellular and community levels. These compounds could be developed as a range of commercial products including antibiotics, antifouling treatments, and biofuel processing.	Rebecca Case	University of Alberta	$250,301	$100,000
Tools for Studying Neural Systems with Optogenetic and Electrophysiological Techniques	Optogenetics is an innovative technology for controlling the activity of specific neurons with light. In association with the Canadian Centre for Behavioural Neuroscience, Dr. Gruber will use optogenetic techniques to conduct experiments in behavioural neuroscience by combining optogenetics with state-of-the-art methods for monitoring neural activity to observe and manipulate brain function.	Aaron Gruber	University of Lethbridge	$368,598	$147,439
Two-Photon Imaging of Cerebral Blood Flow: From Cells and Veaving Animals	Dr. Gordon's research focuses on understanding the cellular mechanisms responsible for cerebral blood flow, providing insights with the potential to advance our treatment of related conditions such as stroke, vascular dementia, cognitive decline, Alzheimer's, and migraine. Complementary to the Hotchkiss Brain Institute's Cerebral Circulation research area, this equipment will enhance the capacity to increase the transfer of laboratory results to clinical practice and drug development.	Grant Gordon	University of Calgary	$752,427	$300,970
Viscoelastic Materials Characterization for Novel Highly Conductive Polymer Blends/ Nanocomposites and Heavy Oils	The infrastructure will develop novel materials for oil recovery technologies and provide a greater understanding of the flow of heavy oils. The technology and tools for this characterization of materials may also uncover novel advanced materials for energy, electronics, and health sectors. The research program will provide training opportunities in nanotechnology, materials science, polymer processing, and new oil field applications.	Uttandaraman Sundararaj	University of Calgary	$557,300	$222,920

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
A hyperspectral infrared imaging facility for the non-destructive spectroscopic scanning of geological core	Equipment purchased will further the study of spectral analysis and digital imaging of sediments for mineral exploration. The capabilities of Dr. Rivard's new laboratory will be important to support Alberta's research initiatives in the area of natural resource development, including oil sands exploration recovery and processing, while mitigating environmental impacts.	Benoit Rivard	University of Alberta	$381,618	$152,647
An aquatic center for the evaluation of the effects of water quality on fish health	Dr. Tierney will use the Infrastructure for environment-animal interaction research for the evaluation of the effects of water quality on fish health. The equipment is essential to determine how changes in water flow, and water quality (e.g. temperature, salinity, sediment load and dissolved contaminants) affect diverse fish species.	Keith Tierney	University of Alberta	$200,505	$80,000
Electron Paramagnetic Resonance Spectroscopy Facility for Nanomaterials and Advanced Catalysis	The research equipment purchased with this award will allow Drs. Rene Boeré and Paul Hayes to uncover novel nanomaterials and advanced catalysis, and provide scientific instrumentation that presently does not exist in Canada. The research may lead to improved drug development, materials synthesis, and the production of value added chemicals.	Rene Boeré Paul Hayes	University of Lethbridge	$441,105	$176 004
Electrophysiological Imaging and Photostimulation of Neuron-Glia Networks in Ex Vivo Neurological Disease Models	The imaging equipment purchased with this award will be used to develop novel pharmacological strategies for treatment of neurological diseases. The results of Drs. Ballanyi, Smith, and Todd's research may help us to develop better treatments for disorder or injury of the brain, spinal cord, or nervous system.	Klaus Ballanyi Peter Smith Kathryn Todd	University of Alberta	$1,990,927	$796,371
Facility for the Experimental Characterization of Metamaterial Imaging Devices, Radiating Structures, and Scattering Surfaces	Dr. Iyer's research seeks to develop new directions in classical areas of electromagnetics and RF/ microwave engineering, but is centered around the study of 'metamaterial' technologies. Metamaterials are artificial materials engineered to have properties that may not be found in nature and may have many diverse applications in ICT, aerospace, solar power, and invisibility-cloaking to name a few. The new laboratory will also be important to support Alberta's research initiatives in the area of applied electromagnetics research.	Ashwin Iyer	University of Alberta	$611,985	$240,000

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Facility for the Fundamental Characterization and Application of Advanced Materials	Dr. Serpe's research will investigate polymeric materials, metal/inorganic nanoparticles, and polymer/ nanoparticle hybrid materials in the development of advanced materials. The research supported by this award may lead to materials for a variety of industrial uses, such as improved surface coatings for lubrication, ultrasensitive biosensing/ spectroscopic techniques, antibacterial polymeric coatings, and photonic materials.	Michael Serpe	University of Alberta	$370,369	$128,000
Facility to Support the Bench-to-bedside Development of Targeted Drugs and Drug Delivery Systems for Improved Therapeutic Performance	The award supports research in the development of new drugs and drug delivery systems. The results of Drs. Lavasanifar, Kaur and Uludag's research may help us to develop better therapeutic vaccines to treat cancer, engineered biopolymers that deliver mediators of bone growth and/or bone- regeneration in osteoarthritis, and new agents for the prevention and treatment of hepatitis C.	Afsaneh Lavasanifar Kamaljit Kaur Hasan Uludag	University of Alberta	$944,034	$377,614
Fluorometric instrumentation for the measurement of sub-cellular microenvironments	This award will provide Dr. Yates with the required equipment to further advance the field of cell biology research in Alberta. The capabilities of new equipment will also be important to support Alberta's research initiatives in the areas of fundamental biology of immune cells, disease states, and the invention and advancement of research tools.	Robin Yates	University of Calgary	$650,935	$227,923
High-content functional genomic analysis of immune responses	The award supports the purchase of specialized equipment for Dr. Foley's research program to study genomics and cell biology. The new equipment is essential for his team to observe novel immune responses, and will complement the facilities already available at the University of Alberta's high-content imaging systems for cell culture.	Edan Foley	University of Alberta	$838,247	$295,299
Ion homeostasis - from bench to bedside	Drs. Alexander, Casey, and Cordat will use the award to purchase the equipment required to understand the fundamental molecular mechanisms behind many diseases including disorders of the kidney, heart, and eye. A better understanding of ion homeostasis may lead to new treatments for these diseases and to new therapeutic strategies.	Robert Todd Alexander Joseph Casey Emmanuelle Cordat	University of Alberta	$726,973	$290,786
Mass Spectrometry for the Analysis of High Molecular Weight Protein Complexes	The award will purchase leading-edge mass spectrometry (MS)-based tools to characterize bio- logically important high molecular weight proteins and protein complexes. Dr. Klassen's laboratory will provide powerful tools in the discovery and development of novel strategies for the treatment of a variety of diseases and microbial infections, which will lead to the development and commercialization of new drugs.	John Klassen	University of Alberta	$1,099,717	$439,887

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Mechanotransduction in cardio-vascular tissues: role of residual stresses explored by real-time in situ microscopy coupled with biomechanical measurements	This award will support the purchase of equip- ment that will enable Dr. Di Martino to investigate how changes in the structure and function of the components of blood vessels and heart tissues can lead to serious cardio-vascular ailments. The findings from preliminary research may lead to further developments in novel treatment options for these diseases.	Elena Di Martino	University of Calgary	$297,389	$81,240
Microparticle Engineering Facility	This award will support the equipment needed to establish a facility, necessary to advance Dr. Vehring's research program in the field of particle engineering. Structured microparticles have significant commercial potential, and several development programs for respiratory therapeutics are underway. The research may also enable a variety of novel products in the pharmaceutical, biotechnology, and food industries.	Reinhard Vehring	University of Alberta	$536,716	$200,000
Molecular characterization of disease mechanisms involved in genetically determined cardiomyopathies	This award will support the purchase of equipment that will enable Dr. Brenda Gerull to further understand the novel genetic factors influencing cardiovascular disease. The equipment and research will also provide valuable opportunities for students to advance their knowledge of cardiovascular disease aetiology, provide training for students in advanced scientific methods, and ultimately, to improvements in healthcare.	Brenda Gerull	University of Calgary	$617,167	$246,866
Molecular microbiology laboratory for ecology and physiology (M2LEAP)	This award will help Drs. Lanoil and Stein establish a laboratory to understand the structure and function of organisms behind the production and consumption of greenhouse gasses. The researchers will investigate how greenhouse gasses may be regulated by microbial activity and the associated climate change impact. The presence of this infrastructure will establish the laboratory as the centre for environmental microbial ecology and physiology in Canada.	Brian Lanoil Lisa Stein	University of Alberta	$528,869	$206,000
Multiparametric Flow Cytometry System for the Development and Characterization of Environmental Biotechnology Remediation Strategies	Equipment purchased with this award will be used for the development and characterization of microorganisms used to degrade contaminants into non-harmful end products. Dr. Ulrich will investigate several research areas, such as removing pharmaceuticals and nanomaterials in drinking water systems, and greenhouse gases from the oil sands industry.	Ania Ulrich	University of Alberta	$334,294	$125,000

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Open Social Mobile Systems for eLearning Research (OSMoSYS)	Drs. Dron and McGreal will combine their expertise in open social mobile systems to develop four synergistic components that researchers at Athabasca University believe characterize the next generation of educational technology systems; Open (free) content, social networking, mobile devices, and ubiquitous (sensor based) triggers to learning opportunities.	Jon Dron Rory McGreal	Athabasca University	$951,305	$346,152
Oxidative Stress and Stress Signaling Facility	The facility, established with the support of this award, will allow Dr. Klotz to conduct innovative research in the field of drug safety and risk assessment. The facility will also support cutting edge research on understanding drug side effects based on oxidative stress.	Lars Klotz	University of Alberta	$452,796	$181,118
Small animal PET/CT: An innovative preclinical multimodality molecular imaging platform for translational research	The infrastructure supported by this award will augment Dr. Wuest's research by equipping his team with the technology to extend their innovative translational cancer research program. Molecular imaging in living subjects offers distinct advantages when compared with conventional in vitro and cell culture research techniques. His research may lead to a faster diagnosis of the disease and more effective treatments.	Frank Wuest	University of Alberta	$1,974,632	$789,853
State-of-the-Art Ultra-sound Biomicroscope for the Evaluation of Myocardial & Vascular Function in Maternal, Fe- tal and Placental Disease in Small Animals	The award will support in vivo ultrasound biomicroscope technology to explore fetal cardiovascular and pulmonary vascular development. A better understanding of myocardial and vascular functions may lead to new treatments for heart disease, and to new therapeutic fetal and neonatal cardiovascular diseases and preventative strategies.	Lisa Hornberger Sandra Davidge Bernard Thébaud	University of Alberta	$597,997	$239,199
Steroid hormone sample preparation and mass spectrometry laboratory	The equipment supported by this award will be used to investigate the body's responses to steroid hormones. Dr. Wynne-Edwards' laboratory will be a powerful tool in improving our fundamental understanding of individual responses to both chronic and acute stress, leading to reduced chronic disease, improved mental health, and healthier children at birth.	Katherine Wynne- Edwards	University of Calgary	$999,950	$299,598
The Alberta Dialysis Databank (ADD)	The equipment purchased with this award will enable the development of an innovative databank, recording hemodialysis treatment strategies, and outcome data from all patients treated in Alberta. The laboratory will be a powerful tool in designing future programs for the treatment and prevention of kidney failure. The databank is also expected to lead to the discovery of new therapeutic technologies.	Scott Klarenbach	University of Alberta	$1,559,115	$623,646

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
The brain in action: A research facility for the study of sensory and motor integration in healthy and neurological populations	The award will help support the creation of a research facility to study sensorimotor functions in healthy and neurological populations. The research supported by this award may lead to improved diagnosis and treatment of common neurological disorders such as stroke, Parkinson's disease, and epilepsy.	Claudia Gonzalez	University of Lethbridge	$244,712	$97,885
The Last Best West: The Alberta Land Settlement Infrastructure Project	This award will support the equipment to enable Drs. Baskerville, Carter, and Gouglas to develop a Alberta land settlement database. The combination of geo-physical, census, and Homestead data creates a unique infrastructure for understanding early land use in Alberta. The data will be important to support Alberta's research initiatives in the areas of natural resources and land management.	Peter Baskerville Sarah Carter Sean Gouglas	University of Alberta	$984,505	$393,802
Translational Health Research Collaboratorium	The award will support the development of a custom database for a network of clinical and social scientists with common goal of conducting world class translational health research. Drs. Kaplan, Saunders, and Coffin's collaboratorium will be a powerful tool in designing future programs for the treatment and prevention of gastrointestinal and hepatology diseases.	Gilaad Kaplan Chad Saunders Carla Coffin	University of Calgary	$438,481	$175,393

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
A high pressure chemisorption analyzer for characterization of heterogeneous catalysts under industrial conditions	Funds are requested to purchase equipment for the characterization of heterogeneous catalysts under industrial conditions. The equipment consists of a chemisorption analyzer, which is capable of performing temperature programmed reactions, and a mass spectrometer to analyze products.	Vinay Prasad, Natalia Semagina	University of Alberta	$323,064	$129,175
A Scaleable Optical Sensor Network for Ecosystem Health	Equipment purchased will be used to implement a network of optical monitoring and remote sensing devices to detect changes in ecosystems, such as forests, cropland, or rangeland. The project will gather extensive and integrated environmental data in a cost-effective way, while providing essential information for the sustainable management of Alberta's resources.	John Gamon	University of Alberta	$266,703	$100,000
Advanced Laboratory for Ubiquitous Sensor Network	Equipment purchased with this award will be used to establish a network of self-sustaining (autonomous) sensors to monitor various environments, including agricultural areas, and oil and gas fields. The equipment and research will also provide valuable training opportunities to students interested in developing wireless sensor network technology and data analysis skills.	Henry Leung	University of Calgary	$980,825	$392,331
An Analysis Suite for Characterizing of Smart Polymer/Nanoparticle Composites	The award will purchase specialized equipment, including a differential photocalorimeter and an infrared camera, which will be used to study smart polymer/nanoparticle composites. These materials undergo changes when they are exposed to different stimulus like a magnetic field or light. The research will characterize the new materials to better predict and manipulate their unique behaviour, with the long term aim of developing them for biomedical applications.	Anastasia Elias	University of Alberta	$192,259	$76,903
Analysis of the role of genetically defined inter- neurons in the operation of the locomotor and respiratory CPGs.	The studies proposed in this application will investigate the structure and function of neural networks that underlie simple rhythmic behaviours, such as breathing (respiration) and walking (locomotion). The results of these studies will enable us to identify the developmental processes that are essential for the assembly of these neural networks, and allow us to better understand how the respiratory and locomotor behaviours are initiated.	Simon Gosgnach	University of Alberta	$929,302	$371,721

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Biodiversity Science and Conservation Ecology Group	The award will support the purchase of essential computing and field equipment for use in biodiversity conservation and wildlife management research. The research aims to develop tools for better regional conservation planning and improved sustainable forestry management practices, with the long term goal of protecting biodiversity in Alberta.	Scott Nielsen Fangliang He	University of Alberta	$336,830	$115,489
Cell and Molecular Biology Suites for Studying Reproductive Development in Canola and Arabidopsis	The research equipment purchased with this award will allow Dr. Samuel to uncover novel genetic switches that control canola plant reproduction. Identification and manipulation of these novel genes will directly impact canola crop-yield. The infrastructure funds will build cell and molecular biology suites in the Department of Biological Sciences at the University of Calgary.	Marcus Samuel	University of Calgary	$973,538	$280,000
Development of a Prion Agent Preparation Laboratory	This infrastructure will support my prion research laboratory focusing on the pathogenesis of prion agents and the characterization of chronic wasting disease. The research goal is to understand the molecular mechanisms of a prion infection.	Debbie McKenzie	University of Alberta	$208,113	$80,000
Enhancing mining efficiency and decreasing environmental impact using Scanning Probe Microscopy and X-ray Fluorescence Micro- Probe	Efficient and environmentally responsible mineral (coal and oil sands) processing is central to the continuing success of the natural resource based industry. But there are significant challenges. The industry requires step-out technology to exploit more complex forms of minerals, and coal, and deal with unpredictable variability of oil sands ores. The cyclical nature of the industry has resulted in a general reduction in training programs. We need to develop a critical mass in world-class mineral research and training.	Zhenghe Xu	University of Alberta	$797,971	$313,798
Environmental Impact of Prion Diseases	Prion diseases have had an enormous economic and social impact. Of particular importance to Alberta are bovine spongiform encephalopathy (cattle), and chronic wasting disease (deer, moose, elk). This application emphasizes the environmental impact of prion diseases, focusing on the binding of prions to soil, an interaction that enhances infectivity.	Judd Aiken	University of Alberta	$932,206	$340,000
Establishment of a Molecular Parasitology Laboratory	Drug resistance in parasites is an important economic and animal welfare problem for livestock agriculture and a major global human health problem. The proposed infrastructure will be used to investigate molecular mechanisms of drug resistance and apply the knowledge to improved diagnostics and control.	John Gilleard	University of Calgary	$544,505	$212,427

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Establishment of Novel Integrated Xenopus Oocyte Heterologous Expression Technologies for the Study of Nucleoside and Other Membrane Transporter Proteins.	Discovered in the YOUNG laboratory, this molecular study of how CNT and ENT proteins move nucleosides across plasma and intracellular membranes will combine the unique versatility/power of heterologous expression in Xenopus oocytes with other technological innovations to improve and expand therapeutic applications of nucleosides in cancer and other diseases.	James D. Young	University of Alberta	$939,858	$340,000
Germ Line Stem Cell Research Facility	Advances in germ line stem cell research affect biomedical research through generation of animal models and tissue regeneration, agricultural research through improved reproductive efficiency and dissemination of superior livestock genetics, and animal conservation through preservation of genetic material from rare and endangered animals.	Ina Dobrinski	University of Calgary	$605,131	$240,938
In Vivo Cellular Imaging of Brain Structure and Function in Models of Neurological and Neuro- psychiatric Disease	The award will support the purchase of imaging equipment, including an in vivo multiphoton imaging system that allows researchers to see live, real-time, and high resolution views of cells, specifically neurons and glia. The research supported by this award may lead to improved stroke therapy.	Ian Winship	University of Alberta	$999,810	$399,924
In vivo microscopy and real-time quantitative PCR infrastructure to investigate neurodegenerative disorders.	Diseases affecting the central nervous system are a major cause of death and disability in Alberta and Canada. The establishment of the Neurodegeneration Research Unit at the University of Calgary will provide infrastructure to investigate causes and treatments for these pathologies.	Roger J Thompson Shalina Ousman	University of Calgary	$907,839	$363,136
Infrastructure for Investigation of Organic Nitrates and Reactive Halogens in Laboratory Experiments and in Ambient Air	Dr. Osthoff's atmospheric science research will improve our understanding of pathways that lead to formation of secondary pollutants, such as ozone and airborne particulate matter that affect people's health and climate. The atmospheric chemistry research equipment will allow more accurate impact assessments of emissions, and provide scientific instrumentation that presently does not exist in Canada.	Hans Osthoff	University of Calgary	$948,998	$339,691
Infrastructure for studying both the biophysics of infectious prion oligomers and the prion disease pathology they induce.	The infrastructure will be used to: I) isolate and characterize the biophysical properties of infectious prion protein oligomers ; 2) produce 3D reconstructions of neurons in mouse brain slice cultures after exposure to prions; and 3) investigate the early stages of prion disease pathogenesis in vitro.	Valerie Sim	University of Alberta	$1,000,000	$400,000

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Infrastructure for the Environmental Surface Research Laboratory	This fund will be used to equip an environmental surface research laboratory with state of the art equipment for use in research related to nanoparticles, microbes, and organic pollutants, and their interactions with engineered and natural surfaces.	Yang Liu	University of Alberta	$269,450	$105,000
Infrastructure for Understanding the Molecular Basis and Treatment of Cardiac Arrhythmias	The award supports cardiovascular research and the development of new anti-arrhythmic drugs, which would help regulate abnormal heart rhythms. The research will provide fundamental knowledge necessary for developing new, cost-efficient, and more effective therapies for the treatment and prevention of cardiac arrhythmia and sudden death.	S.R. Wayne Chen	University of Calgary	$988,797	$395,519
Laboratory for Polymer Electrolyte Fuel Cell Research	Polymer electrolyte fuel cells (PEFCs) can improve energy efficiency and reduce negative emissions. In order for PEFCs to be commercially viable, their cost has to be reduced and their performance enhanced. Novel micro-fabrication techniques and computational design will be used to develop bio-inspired flow fields and electrodes for PEFCs that achieve the necessary cost reductions and performance improvement for commercialization.	Marc Secanell Gallart	University of Alberta	$211,869	$81,854
Laboratory for the Fabrication & Testing of FRET and Plasmon-enhanced Nanostructured Photo- voltaic Devices	Improvements in the design and processing of organic semiconductors coupled with advances in nanotechnology render possible medium to high efficiency solar cells at a fraction of the cost of conventional silicon-based photovoltaics. The fabrication & testing of such devices is the subject of the proposed research.	Karthik Shankar	University of Alberta	$204,902	$80,000
Molecular Enzymology Laboratory	Equipment purchased will further the study of enzyme kinetics, and the effects of drugs on enzyme behaviour, research that has implications for a basic understanding of enzymes, and for pharmaceutical applications such as understanding drug metabolism. A better understanding of the interaction of drugs with these enzymes may lead to new treatments for Parkinson's disease and to new therapeutic anti-smoking strategies.	Andrew Holt	University of Alberta	$300,801	$120,321

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Molecular mechanisms of PCSK9 and ABCG1 in the maintenance of cholesterol homeostasis	Atherosclerotic heart disease is the number one killer in Canada. The requested infrastructure is critical to the success of my team's research on novel molecular mechanisms in cholesterol homeostasis and atherosclerosis. Our findings will lead to the creation of new therapies to reduce the disease.	Dawei Zhang	University of Alberta	$672,890	$269,158
Petroleum Microbiology Research Laboratory	Equipment purchased with this award will be used to understand the science of anaerobic (oxygen- less) petroleum biodegradation. A better under- standing of anaerobic hydrocarbon metabolism could lead to improved tailings pond reclamation, increased methane production from marginal reservoirs, and more effective natural environmental reclamation.	Lisa Gieg	University of Calgary	$482,559	$193,024
Platelet-Angiogenesis Research Infrastructure for Development of Novel Angiogenesis Regulating Pharmaceuticals	The equipment purchased with this award will support research into cardiovascular disease and cancer in Alberta. Dr. Jurasz aims to better understand the role of blood platelets in regulating the formation of new blood vessels, and investigate their potential to be used as part of a new treatment for damaged tissue from heart disease or cancer.	Paul Jurasz	University of Alberta	$493,171	$197,275
Research Facility for the Characterization of Nano-based Biomaterials for Gene Delivery Applications	My research program is focused towards the design of cationic glycopolymers and glyconanoparticles for gene delivery applications. The acquisition of the following infrastructure, widefield microscope, zeta potential analyzer and differential scanning calorimeter/ thermogravimetric analyzer, will strongly enhance our research capabilities and hence we expect to make significant progress in this highly innovative field of carbohydrate-based nanocarriers.	Ravin Narain	University of Alberta	$304,066	$100,000
Targeting Signaling Pathways in Heart Failure: Potential for New Therapies	The current one year mortality rate after diagnosis of HF remains disturbingly high between 25- 40%, not to mention the human toll of patient suffering prior to deaths. Our project will create a state-of-the art and highly specialized system in order to study the key elements of heart failure in experimental models, which will be complemented by parallel experiments in human explanted hearts with the ultimate aim to foster our understanding of human heart failure and to create new therapies.	Gavin Y. Oudit	University of Alberta	$905,032	$211,430
Ultraperformance Liquid Chromatography - Mass Spectrometry Facility for Plant Bioproducts Analysis	The award will purchase equipment to bolster research in plant metabolism. The equipment will enable the researchers to reliably identify and measure important compounds, made by plants that could have applications in pharmaceuticals, flavours, fragrances, insecticides, and other chemical formulations.	Peter Facchini Dae-Kyun Ro	University of Calgary	$1,076,348	$430,540

Small Equipment Grants Stream 2009-2013	
Number of Projects:	166
Total Cost of Projects:	$111,453,284
Approved RCP Funding:	$42,810,568

Alberta Research Capacity Program Projects

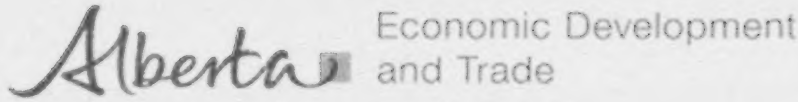
College-Industry Innovation Stream

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Environmental Technologies Infrastructure associated with Clean Energy Production	RCP provided funding for modular applied research infrastructure to reduce industrial impacts on water, soil, and air quality. The platforms will comprise a Produced Water Treatment Train, Air Quality Monitoring Trailer, and Soil Trailer labs for the design, development, testing, and validation of innovative technologies that enhance environmental performance.	Vita Martez	SAIT Poly-technic	$1,999,535	$799,525
Renewable Energy Centre for Sustainable Innovation	The Lakeland Centre for Sustainable Innovation (LCSI) will be located at the Barr Research Site, adjacent to the Vermilion campus. The infrastructure will allow further development of novel thermal storage options for evaluation, the testing of control systems and the collection and transmission of data from the multiple sources to one interface.	Rob Baron	Lakeland College	$1,427,508	$571,001

Project	Project Description	Primary Investigator	Lead Organization	Total Project Cost	RCP Funding
Green Building Technologies Project	The GBT Lab and Demonstration Centre, a 650m2 facility comprised of 20 reclaimed intermodal shipping containers. The NSERC-supported team and new researchers attracted to the facility will conduct industry-driven product and technology prototyping, redesign, testing and development. The new facility will augment the two-storey, 131m2 GBT shipping container office to be built in 2011 . The Lab structure itself will be used to construct Net Zero homes and conduct research to meet NZEH and Architectural Ecology targets, with project activities occurring inside, within, and on the outside of the facility.	David Silburn	SAIT Poly-technic	$1,999,050	$799,525
NAIT Boreal Research Institute: Plant and Seed Technologies for Boreal Reclamation	novaNAIT Boreal Research Institute (nBRI) is located in Peace River, Alberta, 500 km northwest of Edmonton, in the heart of the boreal forest region. As a satellite campus of NAIT, nBRI has a 15-year track record in delivering applied research solutions and transferring knowledge to industry, small and medium-sized enterprises (SMEs), municipalities, and First Nations and Metis organizations. nBRI is requesting investment for the fitting out and equipping of a 1,000 ft2 modular research laboratory at Peace River. The laboratory will facilitate testing of seed viability, dormancy, and germination and will include growth chambers, bench equipment, and cold storage.	Hugh Seaton	NAIT	$2,000,000	$800,000
Oil Sands Environmental Sustainability: Centre for Green Chemistry and Engineering at NAIT	The aim of this project will be to bring NAIT's applied research capacities in chemistry and engineering, to work with SMEs and oil sands operators, for validating existing fluid tailings treatment technologies, and assist in further developing new technologies. The team will approach the problem from an end-to-end systems perspective, i.e. the de-watering and stabilization of fluid tailings, and utilization of the released process-affected water. Accurate measurement and monitoring systems will also be required for compliance.	Haneef Mian	NAIT	$2,526,637	$799,864

College-Industry Innovation Stream
2009-2013

Number of Projects:	5
Total Cost of Projects:	$9,952,730
Approved RCP Funding:	$3,769,915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